US011790721B2

(12) **United States Patent**
Ihara

(10) **Patent No.: US 11,790,721 B2**
(45) **Date of Patent: Oct. 17, 2023**

(54) **SHEET PROCESSING APPARATUS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 54 days.

(21) Appl. No.: **17/378,793**

(22) Filed: **Jul. 19, 2021**

(65) **Prior Publication Data**

US 2022/0028203 A1 Jan. 27, 2022

(30) **Foreign Application Priority Data**

Jul. 22, 2020 (JP) 2020-125457

(51) **Int. Cl.**
G07D 11/23 (2019.01)
G07D 11/50 (2019.01)
G07D 11/17 (2019.01)
G07D 11/235 (2019.01)

(52) **U.S. Cl.**
CPC ***G07D 11/23*** (2019.01); ***G07D 11/17*** (2019.01); ***G07D 11/235*** (2019.01); ***G07D 11/50*** (2019.01)

(58) **Field of Classification Search**
CPC G07D 11/23; G07D 11/17; G07D 11/235; G07D 11/50; G07D 11/24; G07D 11/03; G07D 11/34
See application file for complete search history.

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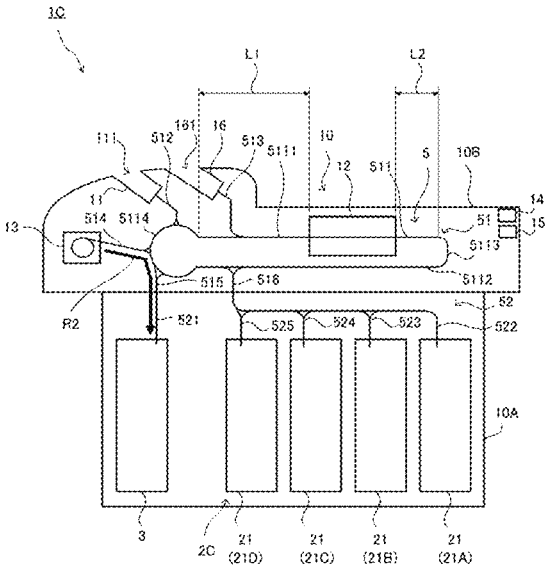
(57) **ABSTRACT**

A sheet processing apparatus includes a first storage and a second storage that each stores a sheet; a transport that transports the sheet; a recognition circuit that performs a first recognition processing to recognize the sheet; an outlet that discharges the sheet in a case that the sheet is recognized as normal in the first recognition processing; a temporary storage that stores the sheet in a case that the sheet is recognized as abnormal in the first recognition processing; and processing circuitry that controls the transport and the recognition circuit such that storage control processing is performed, the storage control processing being processing in which the sheet stored in the temporary storage is transported to the first storage unit or to the second storage.

12 Claims, 13 Drawing Sheets



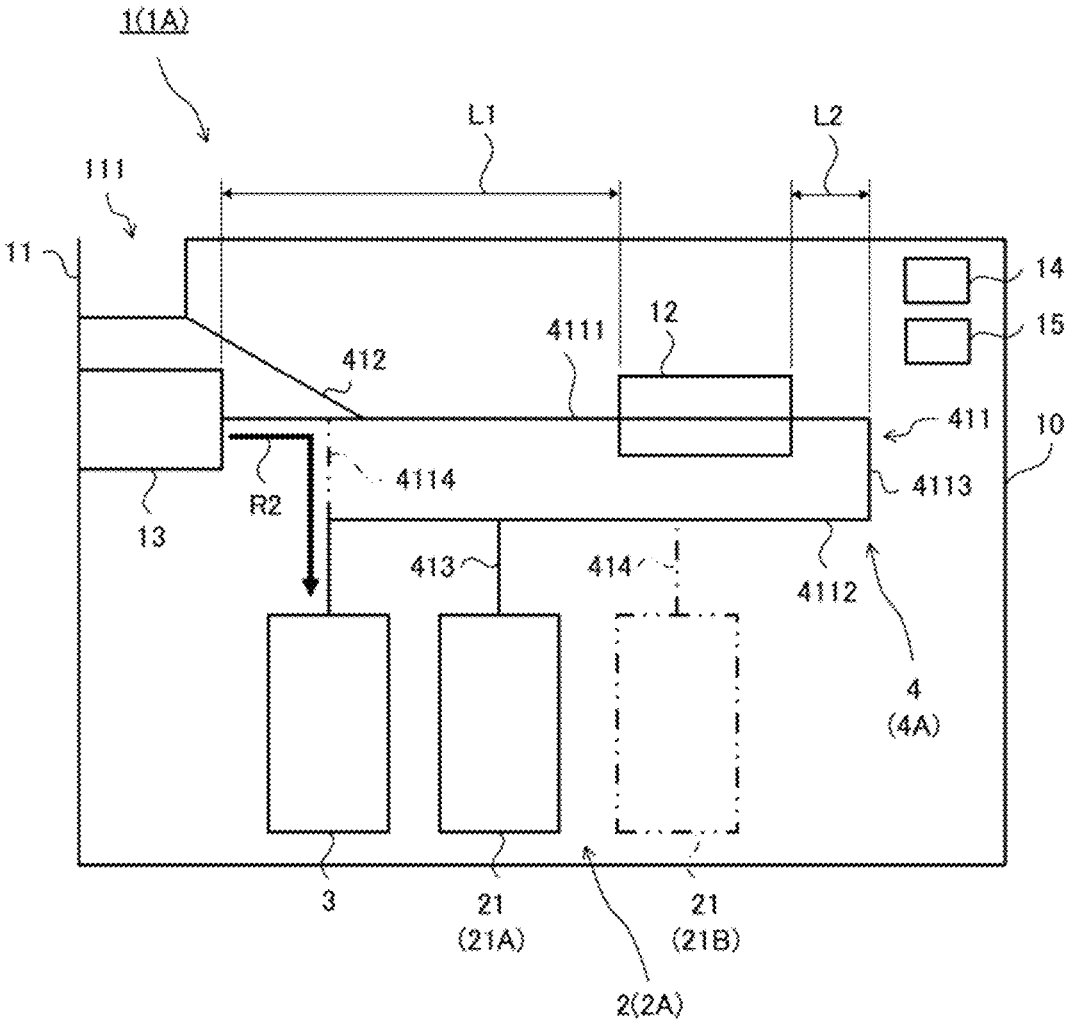

1(1A)
L1
L2
111
11
14
15
12
4111
412
411
10
4114
4113
R2
13
413
414
4112
4
(4A)
3
21
(21A)
21
(21B)
2(2A)

FIG. 1

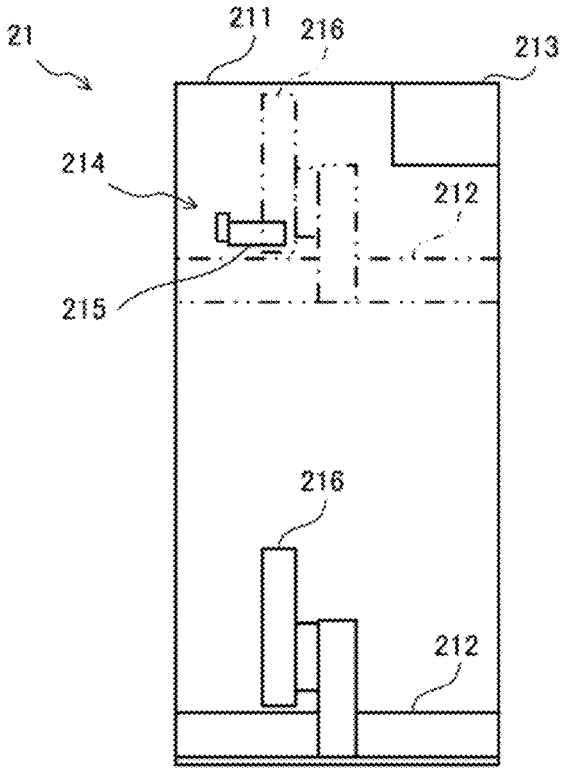

21
211
216
213
214
212
215
216
212

FIG. 2A

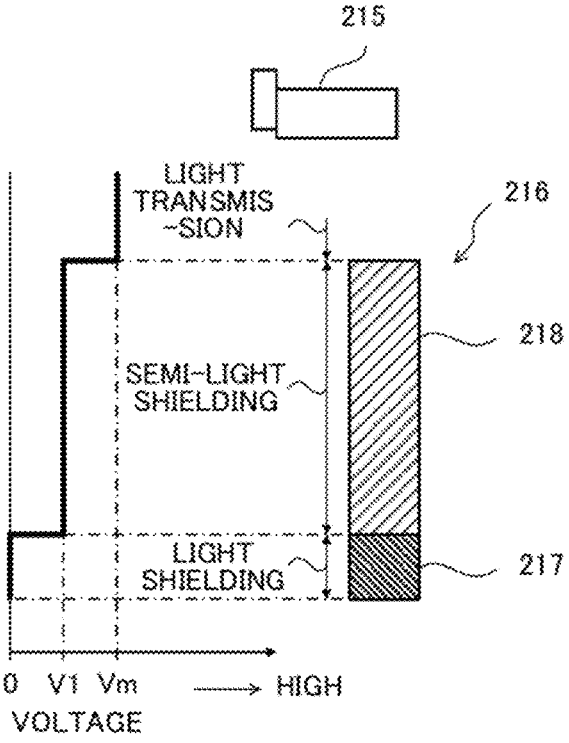
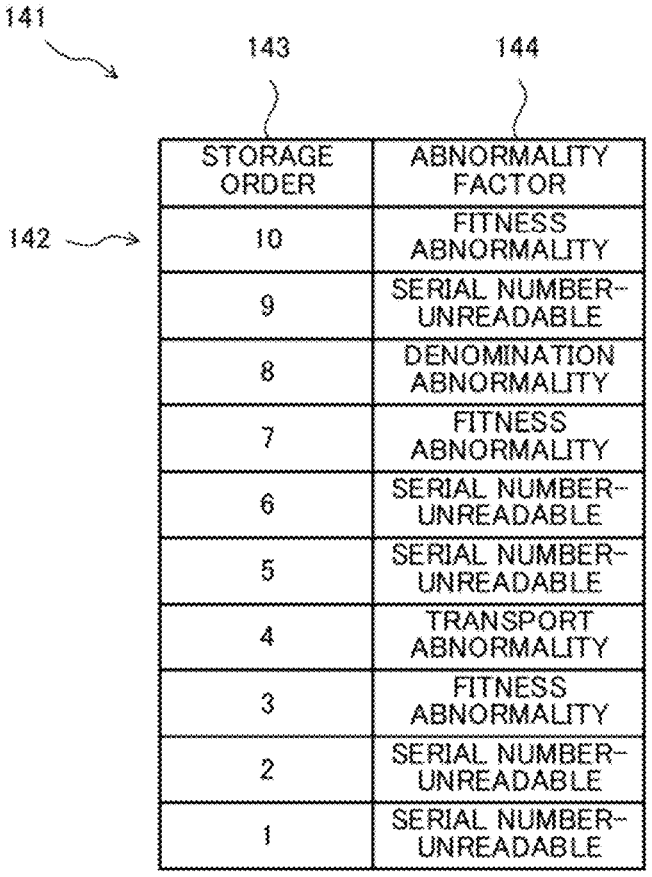

215
LIGHT TRANSMIS -SION
216
218
SEMI-LIGHT SHIELDING
LIGHT SHIELDING
217
0 V1 Vm
HIGH
VOLTAGE

FIG. 2B



STORAGE ORDER	ABNORMALITY FACTOR
10	FITNESS ABNORMALITY
9	SERIAL NUMBER-UNREADABLE
8	DENOMINATION ABNORMALITY
7	FITNESS ABNORMALITY
6	SERIAL NUMBER-UNREADABLE
5	SERIAL NUMBER-UNREADABLE
4	TRANSPORT ABNORMALITY
3	FITNESS ABNORMALITY
2	SERIAL NUMBER-UNREADABLE
1	SERIAL NUMBER-UNREADABLE

FIG. 3

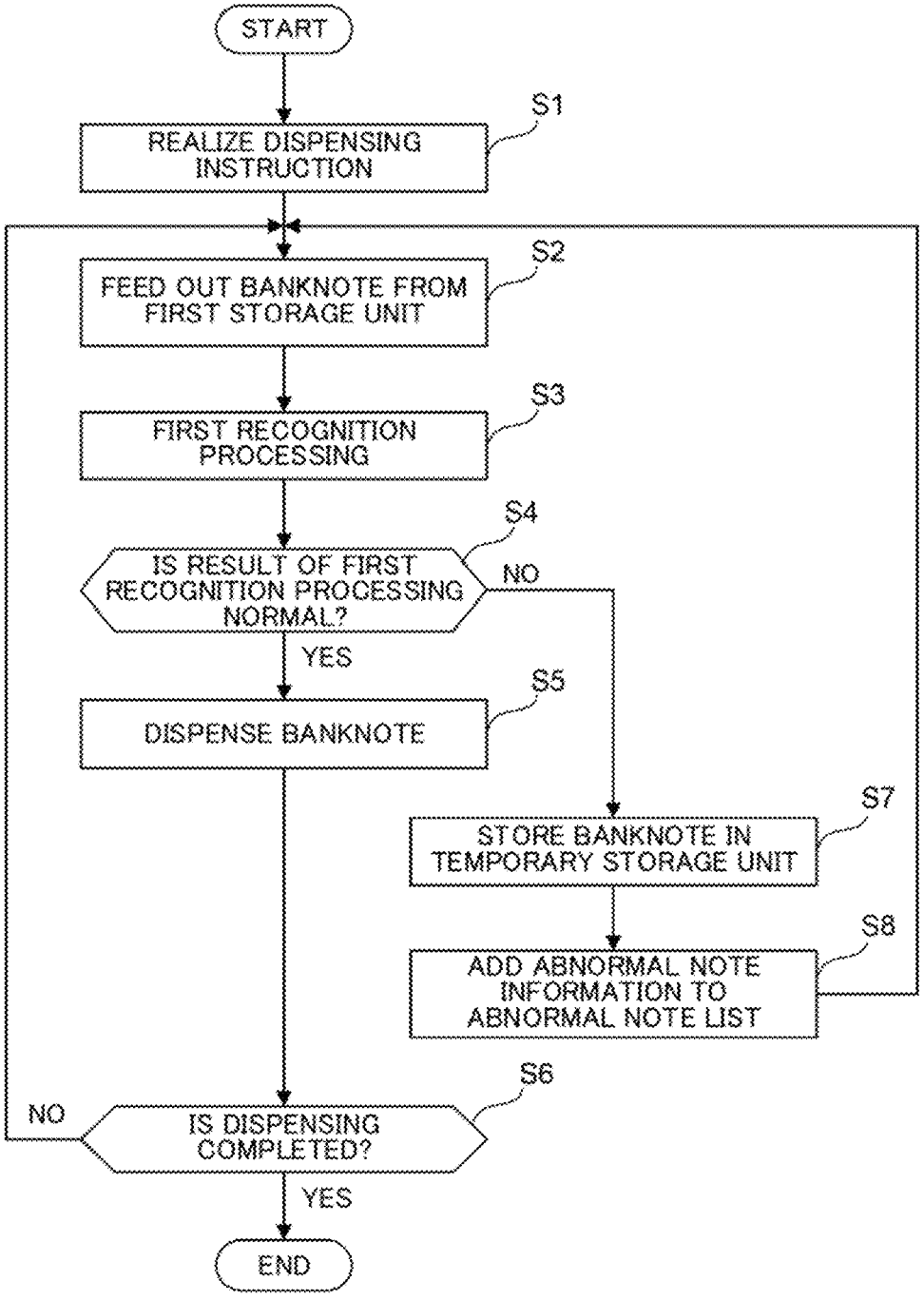

START
S1
REALIZE DISPENSING INSTRUCTION
S2
FEED OUT BANKNOTE FROM FIRST STORAGE UNIT
S3
FIRST RECOGNITION PROCESSING
S4
IS RESULT OF FIRST RECOGNITION PROCESSING NORMAL?
NO
YES
S5
DISPENSE BANKNOTE
S7
STORE BANKNOTE IN TEMPORARY STORAGE UNIT
S8
ADD ABNORMAL NOTE INFORMATION TO ABNORMAL NOTE LIST
S6
NO
IS DISPENSING COMPLETED?
YES
END

FIG. 4

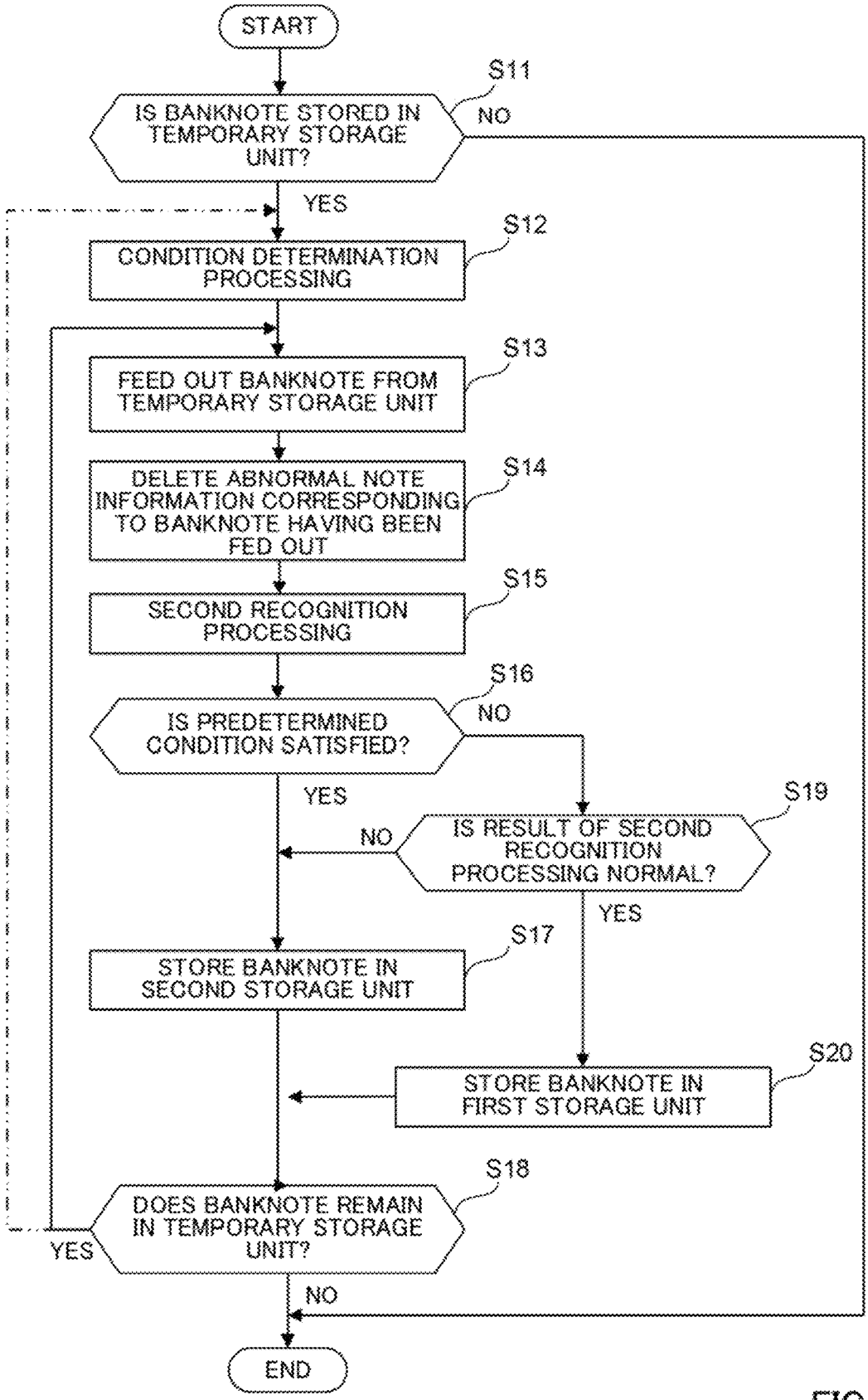

START
S11
IS BANKNOTE STORED IN TEMPORARY STORAGE UNIT?
NO
YES
S12
CONDITION DETERMINATION PROCESSING
S13
FEED OUT BANKNOTE FROM TEMPORARY STORAGE UNIT
S14
DELETE ABNORMAL NOTE INFORMATION CORRESPONDING TO BANKNOTE HAVING BEEN FED OUT
S15
SECOND RECOGNITION PROCESSING
S16
IS PREDETERMINED CONDITION SATISFIED?
NO
YES
S19
IS RESULT OF SECOND RECOGNITION PROCESSING NORMAL?
NO
YES
S17
STORE BANKNOTE IN SECOND STORAGE UNIT
S20
STORE BANKNOTE IN FIRST STORAGE UNIT
S18
DOES BANKNOTE REMAIN IN TEMPORARY STORAGE UNIT?
YES
NO
END

FIG. 5

141A

142A

143 STORAGE ORDER	145A FEEDING SOURCH	144 ABNORMALITY FACTOR
10	FIRST RECYCLING STORAGE APPARATUS	FITNESS ABNORMALITY
9	FIRST RECYCLING STORAGE APPARATUS	SERIAL NUMBER-UNREADABLE
8	SECOND RECYCLING STORAGE APPARATUS	DENOMINATION ABNORMALITY
7	FIRST RECYCLING STORAGE APPARATUS	FITNESS ABNORMALITY
6	SECOND RECYCLING STORAGE APPARATUS	SERIAL NUMBER-UNREADABLE
5	SECOND RECYCLING STORAGE APPARATUS	SERIAL NUMBER-UNREADABLE
4	FIRST RECYCLING STORAGE APPARATUS	TRANSPORT ABNORMALITY
3	SECOND RECYCLING STORAGE APPARATUS	FITNESS ABNORMALITY
2	FIRST RECYCLING STORAGE APPARATUS	SERIAL NUMBER-UNREADABLE
1	FIRST RECYCLING STORAGE APPARATUS	SERIAL NUMBER-UNREADABLE

FIG. 6

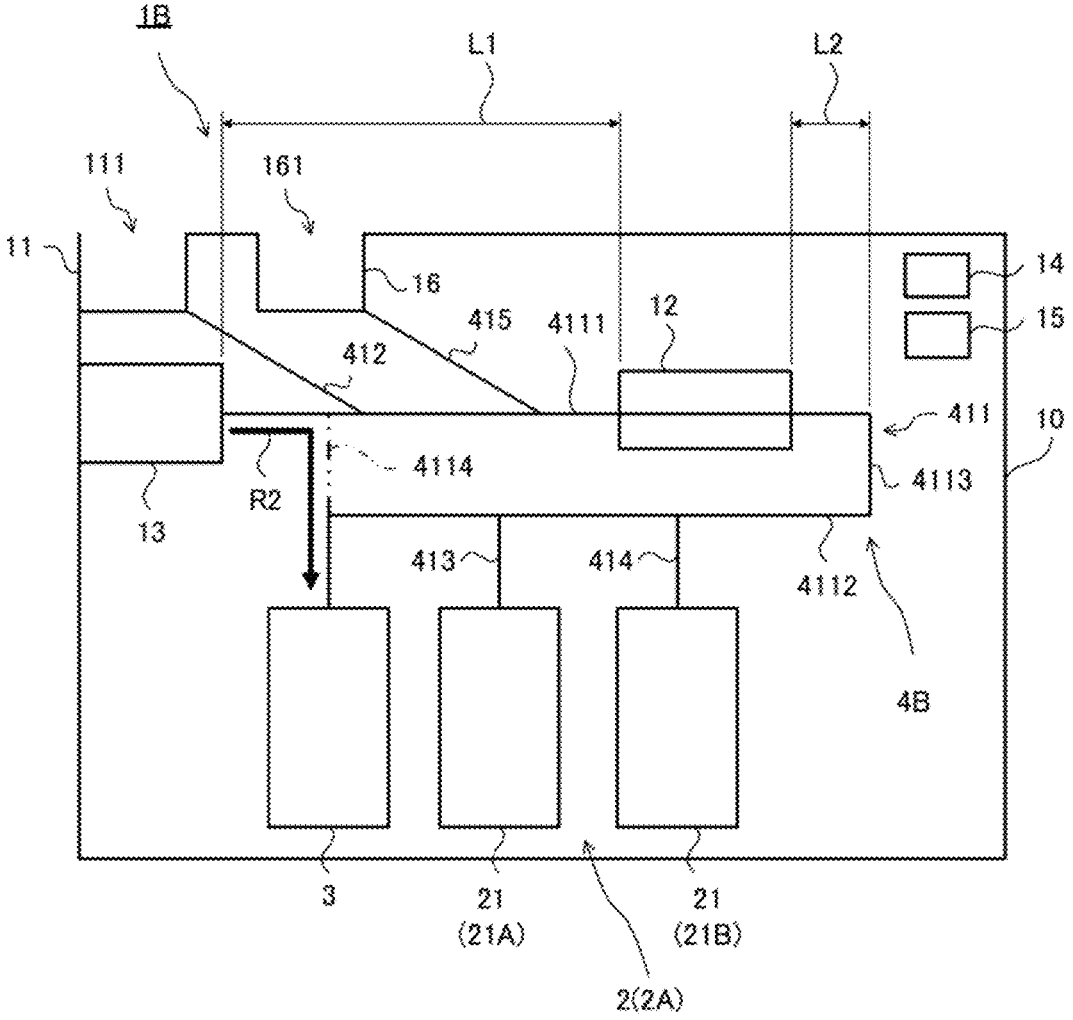
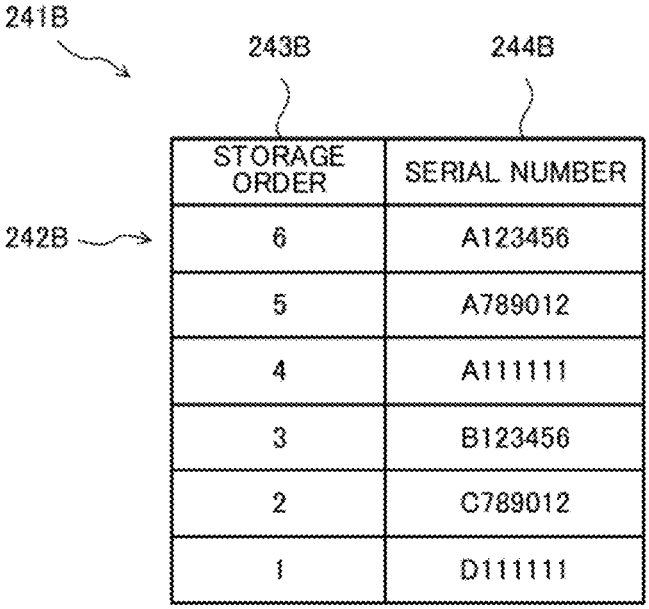

1B
L1
L2
111
161
11
16
415
4111
12
14
15
412
411
10
4114
4113
R2
13
413
414
4112
4B
3
21
(21A)
21
(21B)
2(2A)

FIG. 7



STORAGE ORDER	SERIAL NUMBER
6	A123456
5	A789012
4	A111111
3	B123456
2	C789012
1	D111111

FIG. 8

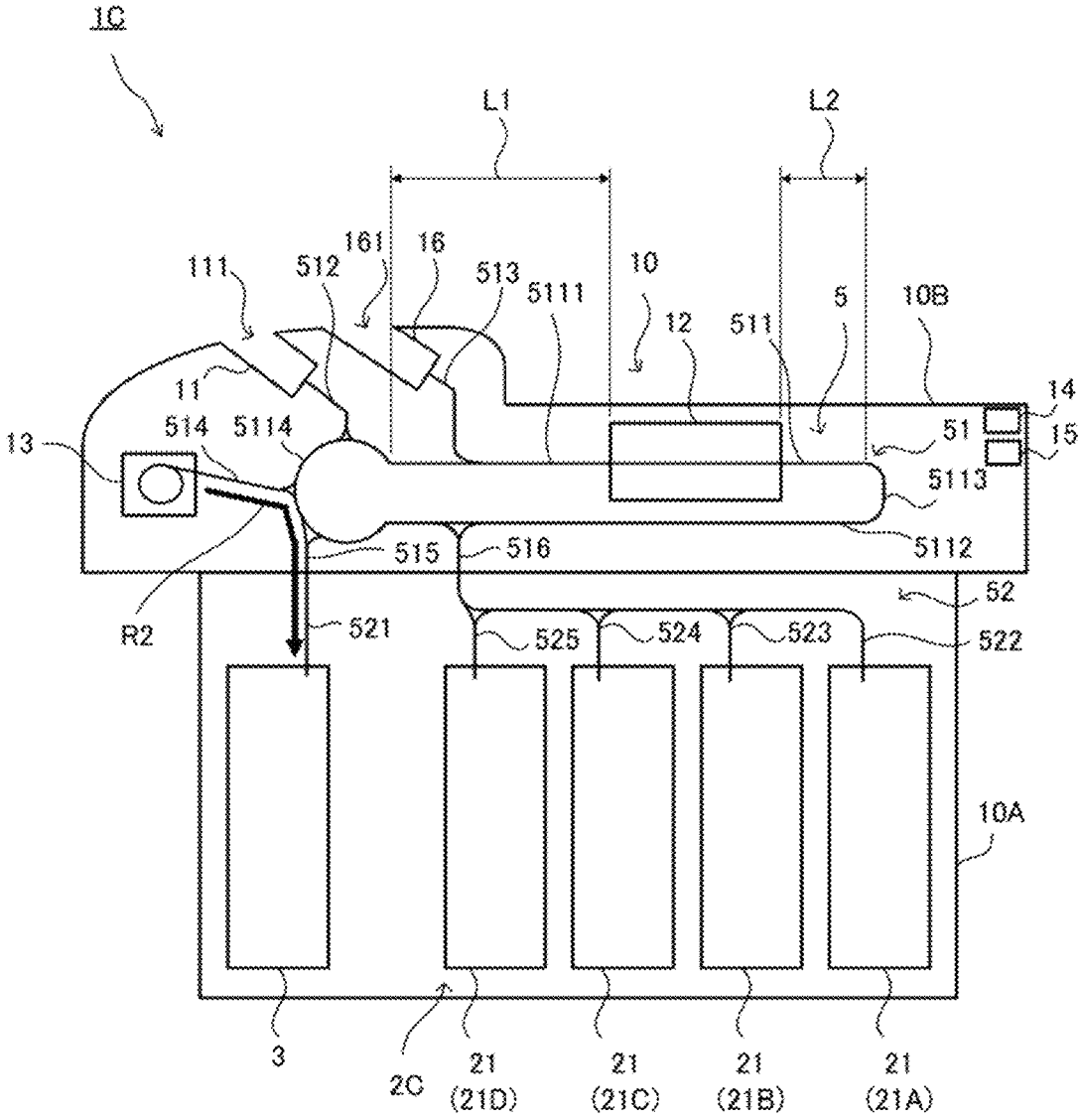

1C
L1
L2
111
512
161
16
513
5111
10
12
511
5
10B
11
514
5114
13
14
15
51
5113
5112
515
516
52
R2
521
525
524
523
522
10A
3
2C
21
(21D)
21
(21C)
21
(21B)
21
(21A)

FIG. 9

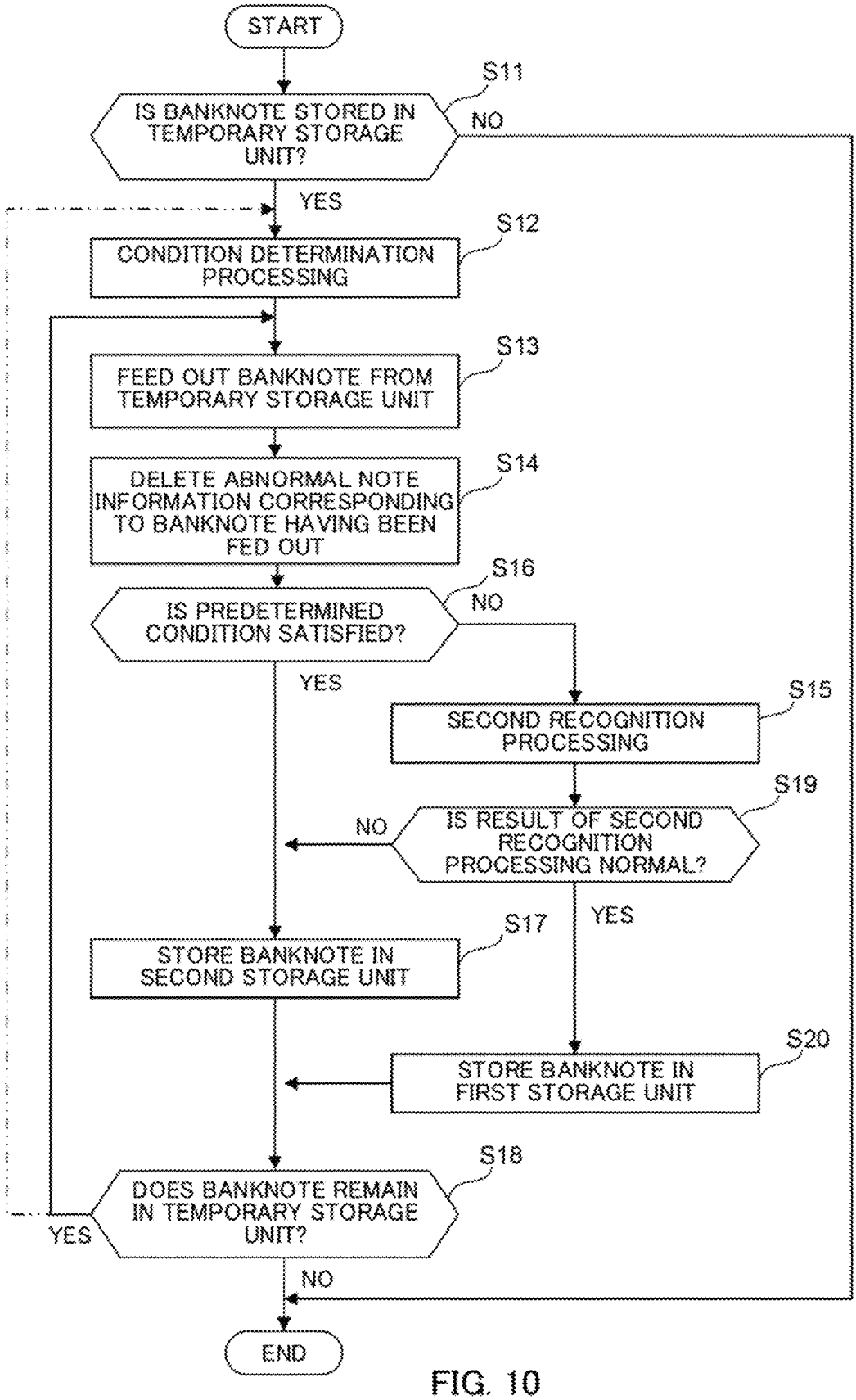

START
S11
IS BANKNOTE STORED IN TEMPORARY STORAGE UNIT?
NO
YES
S12
CONDITION DETERMINATION PROCESSING
S13
FEED OUT BANKNOTE FROM TEMPORARY STORAGE UNIT
S14
DELETE ABNORMAL NOTE INFORMATION CORRESPONDING TO BANKNOTE HAVING BEEN FED OUT
S16
IS PREDETERMINED CONDITION SATISFIED?
NO
YES
S15
SECOND RECOGNITION PROCESSING
S19
IS RESULT OF SECOND RECOGNITION PROCESSING NORMAL?
NO
YES
S17
STORE BANKNOTE IN SECOND STORAGE UNIT
S20
STORE BANKNOTE IN FIRST STORAGE UNIT
S18
DOES BANKNOTE REMAIN IN TEMPORARY STORAGE UNIT?
YES
NO
END

FIG. 10

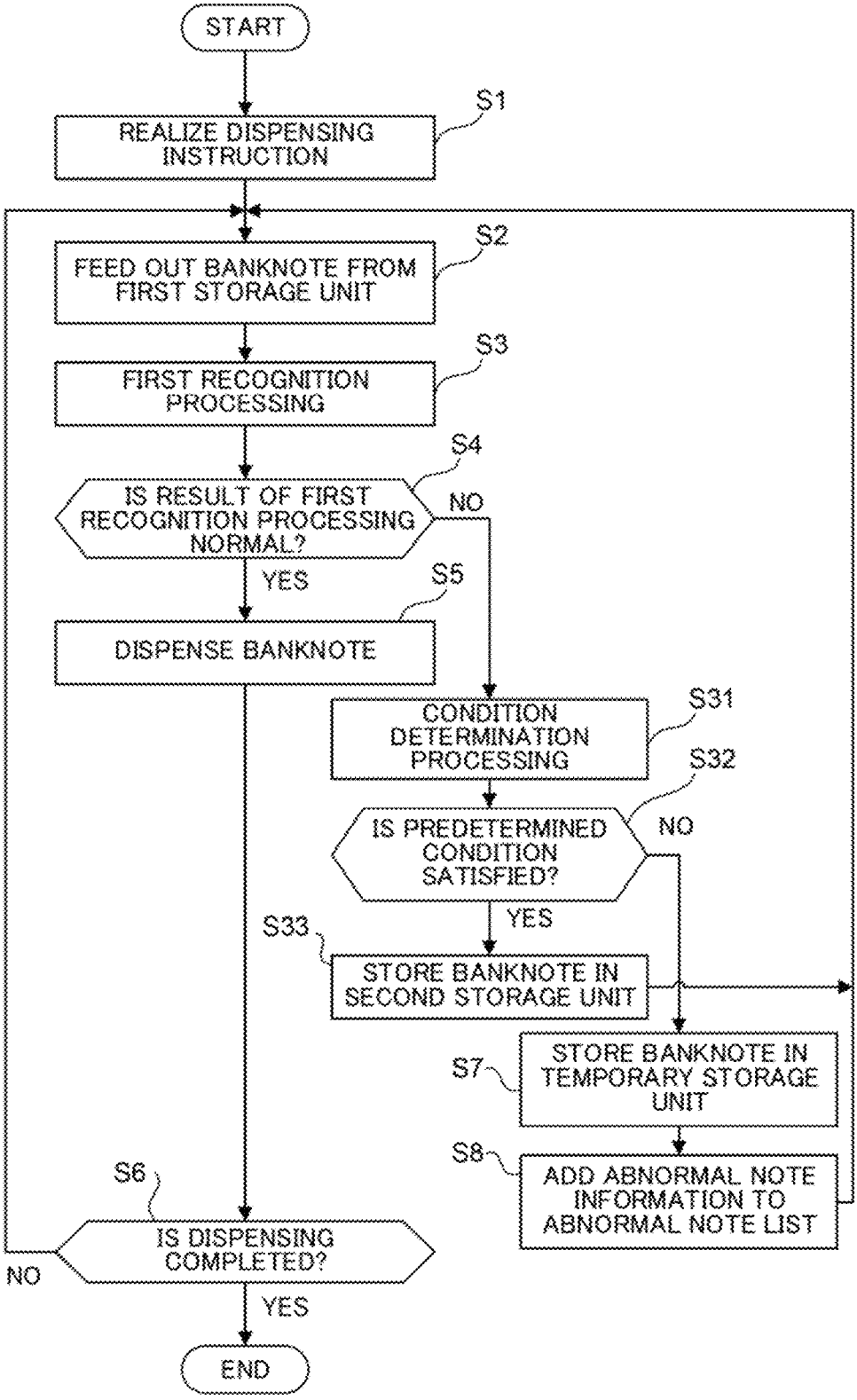

START
REALIZE DISPENSING INSTRUCTION
S1
FEED OUT BANKNOTE FROM FIRST STORAGE UNIT
S2
FIRST RECOGNITION PROCESSING
S3
IS RESULT OF FIRST RECOGNITION PROCESSING NORMAL?
S4
NO
YES
DISPENSE BANKNOTE
S5
CONDITION DETERMINATION PROCESSING
S31
IS PREDETERMINED CONDITION SATISFIED?
S32
NO
YES
STORE BANKNOTE IN SECOND STORAGE UNIT
S33
STORE BANKNOTE IN TEMPORARY STORAGE UNIT
S7
ADD ABNORMAL NOTE INFORMATION TO ABNORMAL NOTE LIST
S8
IS DISPENSING COMPLETED?
S6
NO
YES
END

FIG. 11

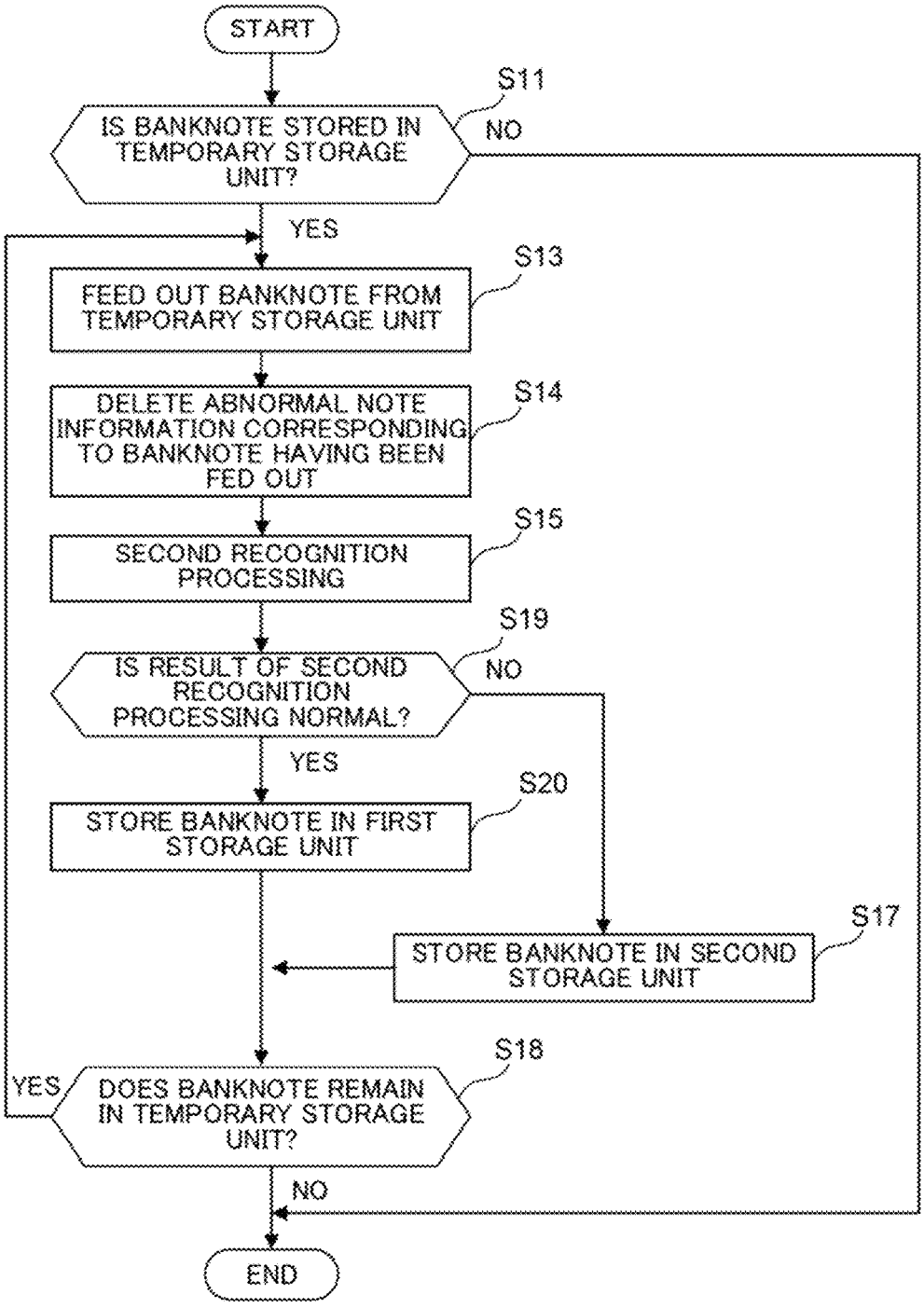

START
S11
IS BANKNOTE STORED IN TEMPORARY STORAGE UNIT?
NO
YES
S13
FEED OUT BANKNOTE FROM TEMPORARY STORAGE UNIT
S14
DELETE ABNORMAL NOTE INFORMATION CORRESPONDING TO BANKNOTE HAVING BEEN FED OUT
S15
SECOND RECOGNITION PROCESSING
S19
IS RESULT OF SECOND RECOGNITION PROCESSING NORMAL?
NO
YES
S20
STORE BANKNOTE IN FIRST STORAGE UNIT
S17
STORE BANKNOTE IN SECOND STORAGE UNIT
S18
YES
DOES BANKNOTE REMAIN IN TEMPORARY STORAGE UNIT?
NO
END

FIG. 12

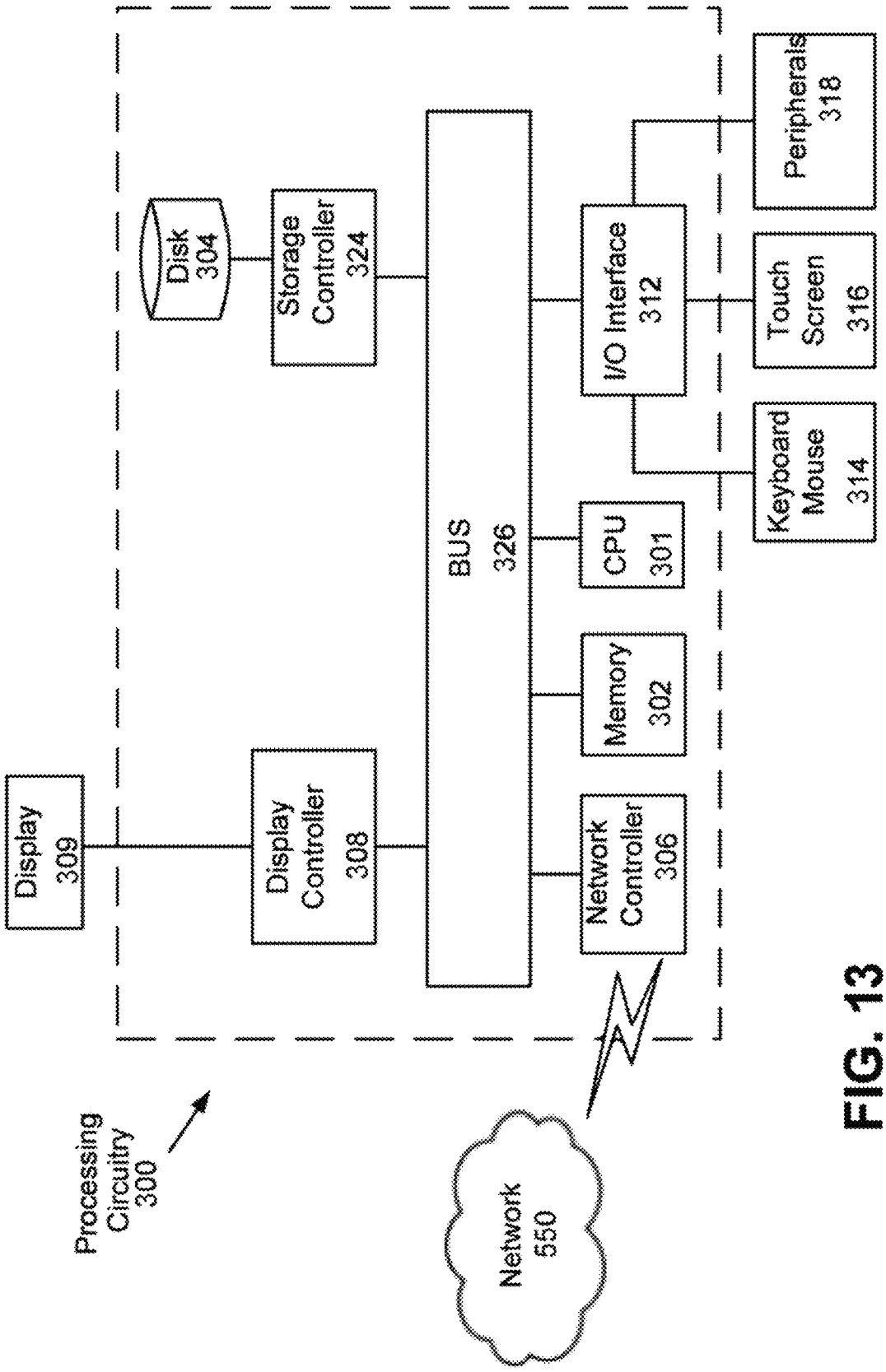

Processing Circuitry 300
Network 550
Display 309
Display Controller 308
Disk 304
Storage Controller 324
BUS 326
Memory 302
Network Controller 306
CPU 301
I/O Interface 312
Keyboard Mouse 314
Touch Screen 316
Peripherals 318

FIG. 13

SHEET PROCESSING APPARATUS

CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority to Japanese Patent Application No. 2020-125457, filed on Jul. 22, 2020, the disclosure of which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

The present disclosure relates to a sheet processing apparatus and a sheet processing method.

BACKGROUND

In the related art, there is known a banknote processing apparatus that dispenses a banknote stored in a storage unit. In the banknote processing apparatus in the related art, a recognition unit recognizes a banknote transported from a banknote cassette when a banknote is dispensed. In the banknote processing apparatus, a customer unit stacks banknotes whose recognition result is normal, and a temporary storage unit stacks banknotes whose recognition result is abnormal.

In the banknote processing apparatus, when banknotes in a dispensing amount are stacked in the customer unit, the recognition unit re-recognizes the banknotes stacked in the temporary storage unit. In the banknote processing apparatus, banknotes whose re-recognition result is normal are stacked in banknote cassettes in accordance with denominations of the banknotes, and banknotes whose re-recognition result is abnormal are stacked in a reject cassette.

SUMMARY

A sheet processing apparatus in accordance with the present disclosure includes a first storage and a second storage that each stores a sheet; a transport that transports the sheet; a recognition circuit that performs a first recognition processing to recognize the sheet; an outlet that discharges the sheet in a case that the sheet is recognized as normal in the first recognition processing; a temporary storage that stores the sheet in a case that the sheet is recognized as abnormal in the first recognition processing; and processing circuitry that controls the transport and the recognition circuit such that storage control processing is performed, the storage control processing being processing in which the sheet stored in the temporary storage is transported to the first storage unit or to the second storage. The storage control processing comprises first processing in which, in a case where a predetermined condition is satisfied, the sheet stored in the temporary storage is transported to the second storage; and second processing in which, in a case where the predetermined condition is not satisfied, the recognition circuit performs a second recognition processing on the sheet stored in the temporary storage, the sheet recognized as normal is transported to the first storage, and the sheet recognized as abnormal is transported to the second storage.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic diagram illustrating an overview of an internal configuration of a banknote processing apparatus according to the present disclosure;

FIG. **2**A is a schematic diagram illustrating an overview of an internal configuration of a recycling storage apparatus according to the present disclosure;

FIG. **2**B is a schematic diagram illustrating an overview configuration of a sensor that forms the recycling storage apparatus;

FIG. **3** is a schematic diagram illustrating a configuration of an abnormal note list according to the present disclosure;

FIG. **4** is a flowchart illustrating dispensing processing according to the present disclosure;

FIG. **5** is a flowchart illustrating storage processing according to the present disclosure;

FIG. **6** is a schematic diagram illustrating a configuration of an abnormal note list according to the present disclosure;

FIG. **7** is a schematic diagram illustrating an overview of an internal configuration of a banknote processing apparatus according to the present disclosure;

FIG. **8** is a schematic diagram illustrating a configuration of a serial number list according to the present disclosure;

FIG. **9** is a schematic diagram illustrating an overview of an internal configuration of a banknote processing apparatus according to the present disclosure;

FIG. **10** is a flowchart illustrating storage processing according to the present disclosure;

FIG. **11** is a flowchart illustrating dispensing processing according to the present disclosure; and

FIG. **12** is a flowchart illustrating storage processing according to the present disclosure.

FIG. **13** is a block diagram of processing circuitry that performs computer-based operations in accordance with the present disclosure.

DETAILED DESCRIPTION OF THE DRAWINGS

Recognition results may be unstable depending on the characteristics of banknotes. For example, a banknote recognized as normal at a time of re-recognition is recognized as a banknote as a dispensing object by a recognition unit at a time of the next or subsequent dispensing, but may be recognized as abnormal again by the recognition unit when the banknote is recognized at the time of the next or subsequent dispensing. In this case, the dispensing efficiency decreases.

An object of the present disclosure is to provide an sheet processing apparatus and a sheet processing method that are capable of suppressing a decrease in the discharging efficiency of a normal sheet.

To achieve the above-described object, a sheet processing apparatus of the present disclosure comprises: a first storage unit and a second storage unit; a transport unit; a recognition unit; an outlet section; a temporary storage unit; and a control unit. Each of the first storage unit and the second storage unit stores a sheet. The transport unit transports the sheet. The recognition unit recognizes the sheet. The outlet section discharges the sheet recognized as normal in first recognition processing that is performed by the recognition unit on the sheet stored in the first storage unit. The temporary storage unit stores the sheet recognized as abnormal in the first recognition processing. The control unit controls the transport unit and the recognition unit such that storage control processing is performed. The storage control processing is processing in which the sheet stored in the temporary storage unit is transported to the first storage unit or the second storage unit. The storage control processing comprises: first processing in which, in a case where a predetermined condition is satisfied, the sheet stored in the temporary storage unit is transported to the second storage

unit; and second processing in which, in a case where the predetermined condition is not satisfied, the recognition unit performs second recognition processing on the sheet stored in the temporary storage unit, the sheet recognized as normal is transported to the first storage unit, and the sheet recognized as abnormal is transported to the second storage unit.

Another sheet processing apparatus of the present disclosure comprises: a first storage unit and a second storage unit; a transport unit; a recognition unit; an outlet section; and a control unit. Each of the first storage unit and the second storage unit stores a sheet. The transport unit transports the sheet. The recognition unit recognizes the sheet. The outlet section discharges the sheet. The control unit controls the transport unit and the recognition unit such that: the sheet stored in the first storage unit is transported to the recognition unit; the recognition unit performs first recognition processing on the sheet that has been transported; the sheet recognized as normal in the first recognition processing is transported to the outlet section; and in a case where a factor in causing the sheet to be recognized as abnormal in the first recognition processing is a serial number-related abnormality in which a serial number attached to the sheet is abnormal, the sheet recognized as abnormal is transported to the second storage unit.

Yet another sheet processing apparatus of the present disclosure comprises: a first storage unit and a second storage unit; a transport unit; a recognition unit; an outlet section; and a control unit. Each of the first storage unit and the second storage unit stores a sheet. The transport unit transports the sheet. The recognition unit recognizes the sheet. The outlet section discharges the sheet. The control unit controls the transport unit and the recognition unit such that: the sheet stored in the first storage unit is transported to the recognition unit; the recognition unit performs first recognition processing on the sheet that has been transported; the sheet recognized as normal in the first recognition processing is transported to the outlet section; and in a case where the sheet is recognized as abnormal in the first recognition processing and a number of sheets stored in the first storage unit satisfies a predetermined condition, the sheet recognized as abnormal is transported to the second storage unit.

A sheet processing method of the present disclosure uses a sheet processing apparatus comprising: a first storage unit and a second storage unit; a recognition unit; an outlet section; and a temporary storage unit. Each of the first storage unit and the second storage unit stores a sheet. The recognition unit recognizes the sheet. The outlet section discharges the sheet recognized as normal in first recognition processing that is performed by the recognition unit on the sheet stored in the first storage unit. The temporary storage unit stores the sheet recognized as abnormal in the first recognition processing. The sheet processing method comprises: performing, in a case where a predetermined condition is satisfied, first processing in which the sheet stored in the temporary storage unit is transported to the second storage unit; and performing, in a case where the predetermined condition is not satisfied, second processing in which the recognition unit performs second recognition processing on the sheet stored in the temporary storage unit, the sheet recognized as normal is transported to the first storage unit, and the sheet recognized as abnormal is transported to the second storage unit.

Another sheet processing method of the present disclosure uses a sheet processing apparatus comprising: a first storage unit and a second storage unit; a recognition unit; and an outlet section. Each of the first storage unit and the second storage unit stores a sheet. The recognition unit recognizes the sheet. The outlet section discharges the sheet. The sheet processing method comprises: transporting the sheet stored in the first storage unit to the recognition unit; performing, by the recognition unit, first recognition processing on the sheet that has been transported; transporting the sheet recognized as normal in the first recognition processing to the outlet section; and transporting, in a case where a factor in causing the sheet to be recognized as abnormal in the first recognition processing is an abnormality of a serial number attached to the sheet, the sheet recognized as abnormal to the second storage unit.

Yet another sheet processing method of the present disclosure uses a sheet processing apparatus comprising: a first storage unit and a second storage unit; a recognition unit; and an outlet section. Each of the first storage unit and the second storage unit stores a sheet. The recognition unit recognizes the sheet. The outlet section discharges the sheet. The sheet processing method comprises: transporting the sheet stored in the first storage unit to the recognition unit; performing, by the recognition unit, first recognition processing on the sheet that has been transported; transporting the sheet recognized as normal in the first recognition processing to the outlet section; and transporting, in a case where the sheet is recognized as abnormal in the first recognition processing and a number of sheets stored in the first storage unit satisfies a predetermined condition, the sheet recognized as abnormal to the second storage unit.

According to the sheet processing apparatus and the sheet processing method of the present disclosure, it is possible to suppress a decrease in the discharging efficiency of a normal sheet.

EMBODIMENTS

The present disclosure is implemented in discharging processing of a sheet processing apparatus. The discharging processing is processing in which a sheet stored in a storage unit of the sheet processing apparatus is discharged from an outlet section. The outlet section is, for example, a dispensing unit. The storage unit is, for example, a recycling storage apparatus. In the discharging processing, a sheet fed out from the storage unit is transported to a recognition unit by a transport unit and is recognized by the recognition unit. A normal note is discharged from the outlet section. An abnormal note is stored in a temporary storage unit. The discharging processing is, for example, dispensing processing. Further, the discharging processing may be collection processing. The collection processing is processing which is performed by a manager who manages the sheet processing apparatus, and in which a sheet in the storage unit is discharged from the outlet section and is collected outside the sheet processing apparatus.

Hereinafter, embodiments of the present disclosure will be described with reference to the accompanying drawings.

In the embodiments described below, a description will be given mainly of a case where the discharging processing is dispensing processing, but the dispensing processing can be replaced with collection processing.

Embodiment 1

(Configuration of Banknote Processing Apparatus)

First, a configuration of a banknote processing apparatus in Embodiment 1 of the present disclosure will be described. FIG. **1** is a block diagram illustrating an overview of an internal configuration of the banknote processing apparatus.

FIG. **2**A is a schematic diagram illustrating an overview of an internal configuration of a recycling storage apparatus. FIG. **2**B is a schematic diagram illustrating an overview configuration of a sensor that forms the recycling storage apparatus. FIG. **3** is a schematic diagram illustrating a configuration of an abnormal note list. The arrangements of the respective configurations of the banknote processing apparatus or the like may be described with the direction indicated in FIG. **1**.

A banknote processing apparatus **1** indicated in FIG. **1** is an example of the sheet processing apparatus. The banknote processing apparatus **1** is installed, for example, in a lobby of a financial institution such as a bank or at a customer service counter thereof. Note that, the banknote processing apparatus **1** may be installed at a settlement counter of a store such as a retail store or in a back office thereof. The banknote processing apparatus **1** dispenses a banknote in accordance with its setting. The banknote is an example of the sheet. The banknote processing apparatus **1** comprises a housing **10**.

The banknote processing apparatus **1** further comprises: a dispensing unit **11**; a recognition unit **12**; a first storage unit **2**; a second storage unit **3**; a temporary storage unit **13**; a transport unit **4**; and a control unit **15**. The transport unit **4** connects the dispensing unit **11**, the recognition unit **12**, the first storage unit **2**, the second storage unit **3**, and the temporary storage unit **13**, and transports a banknote. The recognition unit **12** may be provided on the transport unit **4**. The control unit **15** may be provided outside the housing **10**. In an exemplary implementation, control unit **15** comprises processing circuitry, which will be discussed in detailed later with respect to FIG. **13**. The banknote processing apparatus **1** may comprise an operation unit and a memory unit **14** when needed. Further, the banknote processing apparatus **1** may comprise an interface for connecting an external operation unit and/or an external memory unit.

The dispensing unit **11** is an example of the outlet section. The dispensing unit **11** dispenses (discharges) a banknote recognized as normal in first recognition processing that is performed by the recognition unit **12** on a banknote stored in the first storage unit **2**. The dispensing unit **11** comprises an outlet **111**. The outlet **111** is provided so as to open upward in a front portion of the housing **10**. The dispensing unit **11** is configured so as to stack a plurality of banknotes in an overlapping state. Note that, a shutter that closes the outlet **111** may also be provided.

The recognition unit **12** includes circuitry and generates signals indicating the denomination and authenticity of a banknote transported by the transport unit **4**. These signals are transmitted to the control unit **15**. The recognition unit **12** can also generate signals for detecting the fitness, attitude, and size of a banknote during transport and a space between banknotes during transport, and can transmit the signals to the control unit **15**.

The first storage unit **2** is configured so as to store a banknote as a dispensing object. The first storage unit **2** may be one recycling storage apparatus **21** as indicated by a solid line or may be a plurality of recycling storage apparatuses **21**. The recycling storage apparatus **21** is formed of a stack-type storing unit that stores banknotes in an overlapping manner. The recycling storage apparatus **21** takes in and stores banknotes one by one, and feeds out the stored banknotes one by one. The denominations of banknotes to be stored in the recycling storage apparatus **21** are set in advance. Note that, the recycling storage apparatus **21** may also be formed of a tape-type storing unit that uses a strip-shaped tape attached to the outer peripheral surface of a drum to wind a banknote on the drum together with the tape. Further, the first storage unit **2** (the recycling storage apparatus **21**) may also be configured such that the first storage unit **2** can be set in the housing **10** and can be taken out from the housing **10**, by opening a door provided in the housing **10**.

The banknote processing apparatus **1** may manage a number of banknotes stored in the first storage unit **2**. Further, the banknote processing apparatus **1** may manage a storage state of banknotes stored in the first storage unit **2**. For example, as the storage state, it is possible to exemplify an approximate number of stored banknotes (although not an exact number of banknotes), a storage ratio (a ratio of a number of stored banknotes to a number of banknotes that can be stored), or the like, but the storage state is not limited thereto. The first storage unit **2** may comprise an apparatus that determines a storage state of banknotes stored inside the first storage unit **2**. Here, an example of a specific configuration of the recycling storage apparatus **21** will be described. As illustrated in FIG. **2**A, the recycling storage apparatus **21** comprises a storage housing **211**, a stage **212**, a storage-transport mechanism **213**, and a detection unit **214**.

The stage **212** is configured so as to be capable of storing banknotes in an overlapping state. The stage **212** is configured to be vertically movable inside the storage housing **211** in accordance with an amount of banknotes to be stored. The stage **212** is provided so as to be located downward as the amount of banknotes to be stored is larger and so as to be located upward as the amount of banknotes to be stored is fewer. With such a configuration, the position of the topmost banknote on the stage **212** is constant or almost constant regardless of the amount of stored banknotes.

The storage-transport mechanism **213** is provided, for example, on an upper portion of the storage housing **211**. The storage-transport mechanism **213** places a banknote transported by the transport unit **4** on the stage **212**. The storage-transport mechanism **213** sends out the topmost banknote on the stage **212** to the transport unit **4**.

The detection unit **214** detects that a banknote storage state in the recycling storage apparatus **21** has become "near empty" or "empty". The "near empty" refers to a state in which an amount of banknotes is reduced, and the "empty" refers to a state in which an amount of banknotes is extremely reduced or 0. The detection unit **214** comprises a sensor **215** and a detection plate **216**.

The sensor **215** is formed of, for example, a transmission-type optical sensor. The sensor **215** is fixed above the center of the storage housing **211**, for example. The sensor **215** comprises a light emission unit and a light reception unit. The sensor **215** emits a detection light from the light emission unit toward the light reception unit, and outputs a voltage signal in accordance with a light reception intensity at the light reception unit to the control unit **15**. The voltage signal becomes larger as the light reception intensity is higher.

The detection plate **216** is fixed to the stage **212**. The detection plate **216** is formed to have a vertically extending shape. As illustrated in FIG. **2**B, the detection plate **216** comprises a light shielding unit **217** located at the lower end, and a semi-light shielding unit **218** formed of the part other than the light shielding unit **217**. The height of the light shielding unit **217** (the distance in the vertical direction) is lower than the height of the semi-light shielding unit **218**. The light shielding unit **217** is configured so as to have a light shielding ratio of the detection light of the sensor **215** of 100% or almost 100%. The semi-light shielding unit **218**

is configured so as to have a light shielding ratio of the detection light lower than that of the light shielding unit **217** and exceeding 0%.

In a case where the recycling storage apparatus **21** stores a certain amount of banknotes and, as indicated by a solid line in FIG. **2**A, the stage **212** is located in a lower portion of the storage housing **211**, the detection plate **216** is not located on the light axis of the detection light of the sensor **215**. Accordingly, as illustrated in FIG. **2**B, the magnitude of a voltage signal outputted from the sensor **215** becomes a maximum value Vm. While the voltage signal having a magnitude of Vm is being acquired, the control unit **15** determines that the banknote storage state in the recycling storage apparatus **21** is neither "near empty" nor "empty".

When the stage **212** is raised and the semi-light shielding unit **218** of the detection plate **216** is located on the light axis of the detection light of the sensor **215** as a number of banknotes stored in the recycling storage apparatus **21** decreases, the magnitude of a voltage signal outputted from the sensor **215** becomes V**1** smaller than the maximum value Vm and larger than 0. While the voltage signal having a magnitude of V**1** is being acquired, the control unit **15** determines that the number of banknotes stored in the recycling storage apparatus **21** is "near empty".

When the stage **212** is further raised and the light shielding unit **217** of the detection plate **216** is located on the light axis of the detection light of the sensor **215** as the number of banknotes stored in the recycling storage apparatus **21** further decreases, the magnitude of a voltage signal outputted from the sensor **215** becomes 0 or almost 0. While the voltage signal having a magnitude of 0 or almost 0 is being acquired, the control unit **15** determines that the number of banknotes stored in the recycling storage apparatus **21** is "empty". Even in a case where the recycling storage apparatus **21** is formed of a tape-type storage unit, the recycling storage apparatus **21** may comprise an apparatus that determines a storage state of banknotes stored inside the recycling storage apparatus **21**. For example, the storage state may be determined by detecting the states of banknotes wound on a drum and of a tape. Further, the storage state may also be determined based on the drum diameter, the rotation amount of the drum, the diameter of a reel, the rotation amount of the reel or the movement amount of the tape.

The second storage unit **3** is configured to store a banknote which the control unit **15** determines cannot be dispensed based on a signal from the recognition unit **12**. The second storage unit **3** is formed of a stack-type or tape-type storage unit. Further, the second storage unit **3** may also be configured such that the second storage unit **3** can be set in the housing **10** and can be taken out from the housing **10**, by opening a door provided in the housing **10**.

The temporary storage unit **13** temporarily stores a banknote when the discharging processing is performed. The temporary storage unit **13** is formed of a stack-type or tape-type storage unit.

The transport unit **4** comprises a first transport path **411**, a second transport path **412**, and a third transport path **413**.

The first transport path **411** connects the temporary storage unit **13** and the second storage unit **3**. The first transport path **411** comprises an upper-side path **4111** extending longitudinally (a first direction), a lower-side path **4112** extending longitudinally below the upper-side path **4111**, and a rear reversing path **4113** extending vertically (a second direction) on the rear side to connect the upper-side path **4111** and the lower-side path **4112**. Here, the front side is a side on which the dispensing unit **11** of the banknote processing apparatus **1** is provided (the left side in FIG. **1**).

The temporary storage unit **13** is connected to the front end of the upper-side path **4111**. The upper-side path **4111** is provided with the recognition unit **12**. The recognition unit **12** is provided at any position. However, the recognition unit **12** may be provided, as an example, at a position at which a distance L**1** of a part (a straight part) of the upper-side path **4111**, where the part extends in the horizontal direction from the front end of the recognition unit **12** to the temporary storage unit **13**, is longer than a distance L**2** of a part (a straight part) of the upper-side path **4111**, where the part extends in the horizontal direction from the rear end of the recognition unit **12** to the rear reversing path **4113**. Thus, both the distance from the front end of the recognition unit **12** to the temporary storage unit **13** and the distance from the rear end of the recognition unit **12** to the first storage unit **2** can be sufficiently large. The second storage unit **3** is connected to the front end of the lower-side path **4112**.

The second transport path **412** connects the dispensing unit **11** and a position of the upper-side path **4111**, where the position is on the front side of the recognition unit **12**. A connection part between the second transport path **412** and the upper-side path **4111** is provided with a first diverter mechanism.

The third transport path **413** connects the recycling storage apparatus **21** and a position of the lower-side path **4112**, where the position is on the rear side of a connection part between the lower-side path **4112** and the temporary storage unit **13**. A connection part between the third transport path **413** and the lower-side path **4112** is provided with a second diverter mechanism.

The first transport path **411** to the third transport path **413** are each formed of a combination of a roller, a belt wound on the roller, a motor that drives the roller, a sidewall, and the like. Tracking sensors that detect the passage of a banknote are provided at predetermined positions of the first transport path **411** to the third transport path **413**. The control unit **15** detects the position of a banknote based on detection signals from the tracking sensors, and controls the first diverter mechanism and the second diverter mechanism, thereby transporting the banknote to a predetermined configuration.

When needed, an operation unit that outputs an operation signal based on a setting inputted by an operator to the control unit **15** may be provided. Note that, the operation unit may be provided, for example, in the front portion of the housing **10** or may be formed of an operation apparatus connected to the banknote processing apparatus **1** by a cable or wirelessly.

When needed, the memory unit **14** may be provided. The memory unit **14** stores various data to which the control unit **15** refers. For example, the memory unit **14** may store an abnormal note list **141** as illustrated in FIG. **3**. The abnormal note list **141** is a list related to banknotes which are recognized as abnormal by the recognition unit **12** when the discharging processing is performed and which are therefore stored in the temporary storage unit **13**. The abnormal note list **141** comprises abnormal note information **142** corresponding to each banknote. When one banknote is stored in the temporary storage unit **13**, the abnormal note information **142** corresponding to the banknote is added to the abnormal note list **141** by the control unit **15**. When one banknote is fed out from the temporary storage unit **13**, the abnormal note information **142** corresponding to the banknote is deleted from the abnormal note list **141** by the control

unit **15**. The abnormal note information **142** comprises storage order information **143** and abnormality factor information **144**.

The storage order information **143** indicates the order of storage of banknotes in the temporary storage unit **13**. The abnormality factor information **144** indicates a factor in causing a banknote to be recognized as abnormal. As the abnormality factor information **144** of one banknote, a plurality of factors may be stored. In the example of FIG. **3**, however, one factor corresponds to one banknote.

For example, the factor indicated by the abnormality factor information **144** may be an abnormality of a serial number. In a case where a serial number of a banknote read by the recognition unit **12** when the discharging processing is performed satisfies a predetermined condition, the banknote is determined as abnormal. The factor in causing the banknote to be recognized as abnormal is an abnormality of the serial number. The abnormality of a serial number may comprise "serial number-unreadable" and "serial number-disagreement". The abnormality of "serial number-unreadable" is an abnormality in which a serial number of a banknote cannot be at least partially read by the recognition unit **12**. Note that, the factor indicated by the abnormality factor information **144** may be "serial number-unreadable" in a case where characters more than a number of digits set in advance cannot be read or in a case where, regardless of a number of digits that cannot be read, a character of a particular digit cannot be read. The abnormality of "serial number-disagreement" is an abnormality in which a serial number read by the recognition unit **12** when the discharging processing is performed disagrees with a predetermined serial number. The predetermined serial number is a serial number stored in advance as a serial number of a banknote to be dispensed. For example, the predetermined serial number may be a serial number stored as a serial number in a serial number list to be described later.

In a case where the recognition unit **12** recognizes the fitness of a banknote, the factor indicated by the abnormality factor information **144** may comprise "fitness abnormality". This case indicates that a banknote is recognized as an unfit note by the recognition unit **12**. As factors in causing a banknote to be determined as an unfit note, it is possible to exemplify soiling, tearing, corner-folding (a folded corner of a banknote), and perforation.

A case where the factor indicated by the abnormality factor information **144** is "denomination abnormality" indicates that the denomination of a banknote recognized by the recognition unit **12** disagrees with a denomination specified based on the recycling storage apparatus **21** in which the banknote has been stored.

A case where the factor indicated by the abnormality factor information **144** is "transport abnormality" indicates that the transport interval of banknotes transported from the recycling storage apparatus **21** is equal to or less than a predetermined distance, or that banknotes are overlapped. The "transport abnormality" is detected by the recognition unit **12** or the tracking sensors.

The control unit **15** controls the banknote processing apparatus **1** in its entirety. The control unit **15** may also be referred to as a processor or a computer. Details of the processing of the control unit **15** will be described later.

(Operations of Banknote Processing Apparatus)

Next, operations of the banknote processing apparatus **1** will be described. Note that, hereinafter, the banknote recognized as normal by the recognition unit **12** means a banknote for which no abnormality to be recorded as the abnormality factor information **144** in the abnormal note list **141** is detected. The banknote recognized as abnormal by the recognition unit **12** means a banknote for which an abnormality to be recorded as the abnormality factor information **144** is detected.

(1. Dispensing Processing)

First, as an operation of the banknote processing apparatus **1**, dispensing processing that is an example of the discharging processing will be described. FIG. **4** is a flowchart illustrating the dispensing processing. Note that, a number of banknotes to be dispensed in the dispensing processing may be set and inputted by an operator, or may be determined by the control unit **15** based on a dispensing amount set and inputted by an operator.

When the control unit **15** realizes, based on an operation signal from the operation unit, a dispensing instruction of a banknote in a predetermined amount by an operator (step S**1**), the control unit **15** controls the recycling storage apparatus **21** of the first storage unit **2** such that one banknote is fed out (step S**2**).

The control unit **15** controls the transport unit **4** such that the banknote is transported to the recognition unit **12** via the third transport path **413**, the lower-side path **4112**, the rear reversing path **4113**, and the upper-side path **4111**, and the recognition unit **12** performs the first recognition processing (step S**3**). The control unit **15** determines whether the banknote recognized in the first recognition processing is normal (step S**4**).

In a case where it has been determined that the banknote is a normal note (step S**4**: YES), the control unit **15** controls the transport unit **4** and the dispensing unit **11** such that the banknote passes through the upper-side path **4111** and the second transport path **412** and is dispensed from the dispensing unit **11** (step S**5**). The control unit **15** determines whether a total amount of banknotes transported to the dispensing unit **11** has reached the dispensing amount, that is, whether the dispensing is completed (step S**6**). In a case where it has been determined that the dispensing is completed (step S**6**: YES), the control unit **15** ends the dispensing processing. In a case where it has been determined that the dispensing processing is not completed (step S**6**: NO), the control unit **15** performs the processing in step S**2**. Note that, the control unit **15** may determine that the dispensing is completed when realizing that the banknotes have been taken out from the dispensing unit **11**.

In a case where it has been determined that the banknote subjected to the first recognition processing is an abnormal note (step S**4**: NO), the control unit **15** controls the transport unit **4** and the temporary storage unit **13** such that the banknote passes through the upper-side path **4111** and is stored in the temporary storage unit **13** (step S**7**). The control unit **15** adds the abnormal note information **142** of the banknote recognized as abnormal based on a result of the first recognition processing to the abnormal note list **141** (step S**8**), and performs the processing in step S**2**. Although the dispensing processing has been described thus far as an example of the discharging processing, the banknote movement is also the same in the case of the collection processing. For example, operations of the collection processing can be understood by replacing the dispensing amount described above with a collection amount or a number of collected banknotes.

(2. Storage Processing)

Next, storage processing of a banknote stored in the temporary storage unit **13** will be described. FIG. **5** is a flowchart illustrating first storage processing and second

storage processing. The first storage processing and the second storage processing are examples of the storage control processing.

When the discharging processing is completed, the control unit **15** may perform the first storage processing or the second storage processing. Hereinafter, a description will be given assuming that the dispensing processing as the discharging processing is completed. First, a description will be given of the first storage processing.

As illustrated in FIG. **5**, the control unit **15** determines whether a banknote is stored in the temporary storage unit **13** (step S**11**). In a case where it has been determined that no banknote is stored in the temporary storage unit **13** (step S**11**: NO), the control unit **15** ends the storage processing. In a case where it has been determined that a banknote is stored in the temporary storage unit **13** (step S**11**: YES), the control unit **15** performs condition determination processing (step S**12**).

In the condition determination processing, the control unit **15** determines whether a predetermined condition is satisfied. As the predetermined condition, it is possible to exemplify a condition **1-1** and a condition **1-2** described below. In the condition determination processing, the control unit **15** may determine only one of the conditions **1-1** and **1-2** or both the conditions. In the condition determination processing, the control unit **15** may use both the conditions **1-1** and **1-2** as determination objects, determine that the predetermined condition is satisfied in a case where one of the conditions of the determination objects is satisfied, and determine that the predetermined condition is not satisfied in a case where all the conditions of the determination objects are not satisfied.

The condition **1-1** is a condition related to the number of banknotes stored in the first storage unit **2**. For example, the condition **1-1** is a condition that the number of banknotes stored in the recycling storage apparatus **21** at a time when the dispensing processing ends is equal to or less than a first threshold value. In a case where the number of banknotes stored in the recycling storage apparatus **21** is equal to or less than the first threshold value, the control unit **15** determines that the predetermined condition is satisfied. In a case where the number of banknotes stored in the recycling storage apparatus **21** exceeds the first threshold value, the control unit **15** determines that the predetermined condition is not satisfied. Note that, the condition **1-1** may also be a condition that the number of banknotes stored in the first storage unit **2** at a time when a predetermined banknote is ejected from the temporary storage unit **13** is equal to or less than the first threshold value. Note that, the control unit **15** may realize the number of banknotes stored in the recycling storage apparatus **21** based on a counting result of a number of banknotes put into and taken out from the recycling storage apparatus **21** and/or based on a detection result of the weight of banknotes. Further, the control unit **15** may determine whether not the number of banknotes stored in the recycling storage apparatus **21**, but the weight of banknotes is equal to or less than the first threshold value.

The control unit **15** may realize the banknote storage state in the recycling storage apparatus **21** based on a detection result of the sensor **215**. In this case, when the storage state detected by the sensor **215** is "empty" or "near empty", the control unit **15** determines that the condition related to the number of stored banknotes is satisfied, and when the storage state is neither "empty" nor "near empty", the control unit **15** may determine that the condition related to the number of stored banknotes is not satisfied.

The condition **1-2** is a condition related to a number of banknotes stored in the temporary storage unit **13**. For example, the condition **1-2** is a condition that the number of banknotes stored in the temporary storage unit **13** at the time when the dispensing processing ends is equal to or less than a second threshold value. In a case where the number of banknotes stored in the temporary storage unit **13** is equal to or less than the second threshold value, the control unit **15** determines that the predetermined condition is satisfied. In a case where the number of banknotes stored in the temporary storage unit **13** exceeds the second threshold value, the control unit **15** determines that the predetermined condition is not satisfied. Note that, the condition **1-2** may also be a condition that the number of banknotes stored in the temporary storage unit **13** at a time when a predetermined banknote is ejected from the temporary storage unit **13** is equal to or less than the second threshold value.

The control unit **15** may realize the number of banknotes stored in the temporary storage unit **13** based on a number of the abnormal note information **142** in the abnormal note list **141** at the time when the dispensing processing ends and/or based on a content of the storage order information **143**.

When the condition determination processing is performed, the control unit **15** controls the temporary storage unit **13** such that one banknote is fed out (step S**13**). The control unit **15** deletes the abnormal note information **142** corresponding to the banknote, which has been fed out, from the abnormal note list **141** (step S**14**). The control unit **15** controls the transport unit **4** such that the banknote is transported to the recognition unit **12** via the upper-side path **4111**, and the recognition unit **12** performs second recognition processing (step S**15**). The content of the second recognition processing is the same as that of the first recognition processing. The control unit **15** determines whether it has been determined in the condition determination processing that the predetermined condition is satisfied (step S**16**).

In a case where it has been determined that the predetermined condition is satisfied (step S**16**: YES), the control unit **15** controls the transport unit **4** and the second storage unit **3** such that the banknote passes through the upper-side path **4111**, the rear reversing path **4113**, and the lower-side path **4112** and is stored in the second storage unit **3** (step S**17**). That is, the control unit **15** causes the banknote to be stored in the second storage unit **3** regardless of a recognition result in the second recognition processing.

The control unit **15** determines whether a banknote remains in the temporary storage unit **13** (step S**18**). The control unit **15** may determine whether a banknote remains in the temporary storage unit **13**, for example, based on a counting result of a number of banknotes put into and taken out from the temporary storage unit **13** and/or based on a content of the abnormal note list **141**. In a case where it has determined that no banknote remains in the temporary storage unit **13** (step S**18**: NO), the control unit **15** ends the storage processing. In a case where it has been determined that a banknote remains in the temporary storage unit **13** (step S**18**: YES), the control unit **15** performs the processing in step S**13** as indicated by a solid line.

In a case where it has been determined in the condition determination processing that the predetermined condition is not satisfied (step S**16**: NO), the control unit **15** determines whether a result of the second recognition processing of the banknote is normal (step S**19**). In a case where it has been determined that the result of the second recognition processing is normal (step S**19**: YES), the control unit **15** controls

the transport unit **4** and the first storage unit **2** such that the banknote passes through the upper-side path **4111**, the rear reversing path **4113**, the lower-side path **4112**, and the third transport path **413** and is stored in the first storage unit **2** (step S**20**). The control unit **15** performs the processing in step S**18**. In a case where it has been determined that the result of the second recognition processing is abnormal (step S**19**: NO), the control unit **15** performs the processing in step S**17**. That is, the control unit **15** causes the banknote to be stored in the second storage unit **3**.

Next, the second storage processing will be described. The first storage processing and the second storage processing are common except the following two points:

Difference **1-1**: the content of the condition determination processing in step S**12**, and

Difference **1-2**: in a case where it has been determined in step S**18** that a banknote remains in the temporary storage unit **13**, not the processing in step S**13**, but the processing in step S**12** is performed.

The difference **1-1** will be described. In the condition determination processing in step S**12**, the control unit **15** determines whether a condition **1-3** described below is satisfied.

The condition **1-3** is a condition related to a factor in causing a banknote to be recognized as abnormal in the first recognition processing. For example, the condition **1-3** is a condition that the factor in causing a banknote to be recognized as abnormal is an abnormality of a serial number ("serial number-unreadable" or "serial number-disagreement"). In a case where an abnormality of a banknote is an abnormality of a serial number, the control unit **15** determines that only the banknote is a banknote for which the predetermined condition is satisfied. In a case where an abnormality of a banknote is an abnormality other than an abnormality of a serial number, the control unit **15** determines that only the banknote is a banknote for which the predetermined condition is not satisfied. The control unit **15** may also realize an abnormality factor of a banknote based on a content of the abnormality factor information **144** in the abnormal note list **141**.

The difference **1-2** will be described. In a case where it has been determined in step S**18** that a banknote remains in the temporary storage unit **13**, the control unit **15** performs the processing in step S**12** as indicated by a two-dot chain line in FIG. **5**. That is, in the first storage processing, a result of the condition determination processing in step S**12** performed once is applied to all banknotes stored in the temporary storage unit **13**, whereas in the second storage processing, the condition determination processing in step S**12** is performed on each banknote stored in the temporary storage unit **13** and it is determined whether the predetermined condition is satisfied.

In the first storage processing and the second storage processing, the processing in step S**19** that is performed following step S**16** is an example of the first processing. The processing in steps S**19**, S**20**, and S**17** that are performed following step S**16** are examples of the second processing.

Note that, in the first storage processing and the second storage processing, the condition determination processing may be performed after the second recognition processing is performed. In this case, the control unit **15** may perform the processing in steps S**12** to S**15** in the order of step S**13**, step S**15**, step S**12**, and step S**14**, or in the order of step S**13**, step S**12**, step S**14**, and step S**15**.

(Working Effects of Embodiment 1)

Embodiment 1 described above exhibits working effects as described below.

When a banknote stored in the temporary storage unit **13** in the dispensing processing, that is, a banknote recognized as abnormal in the first recognition processing is determined as normal in the second recognition processing, the banknote is stored in the first storage unit **2** and is subjected to the first recognition processing at a time of the next dispensing processing. A banknote that is stored in the temporary storage unit **13** and is then returned to the first storage unit **2** may be recognized as an abnormal note again in the first recognition processing and may be stored in the temporary storage unit **13**. When a banknote that is stored in the temporary storage unit **13** and is then returned to the first storage unit **2** is stored in the temporary storage unit **13** again as described above, the dispensing efficiency may decrease.

To suppress a decrease in the dispensing efficiency as described above, the control unit **15** causes a banknote stored in the temporary storage unit **13** to be stored in the second storage unit **3** in a case where the predetermined condition is satisfied in the first storage processing or the second storage processing. In a case where the predetermined condition is not satisfied, the control unit **15** causes, of banknotes stored in the temporary storage unit **13**, a banknote recognized as normal in the second recognition processing to be stored in the first storage unit **2**, and causes, of the banknotes stored in the temporary storage unit **13**, a banknote recognized as abnormal in the second recognition processing to be stored in the second storage unit **3**.

First, a description will be given of a reason why it is possible to suppress a decrease in the dispensing efficiency in a case where the predetermined condition in the first storage processing is the condition **1-1**.

It is considered that banknotes stored in the first storage unit **2** at the time when the dispensing processing ends comprise a predetermined proportion of banknotes that are recognized as normal in the first recognition processing. Accordingly, in a case where the number of banknotes stored in the first storage unit **2** exceeds the first threshold value, the first storage unit **2** highly likely comprises more banknotes that are recognized as normal in the first recognition processing, in comparison with a case where the number of banknotes stored in the first storage unit **2** is equal to or less than the first threshold value. Accordingly, in a case where the number of banknotes stored in the first storage unit **2** exceeds the first threshold value, it is possible to complete the dispensing by returning all banknotes stored in the temporary storage unit **13** to the first storage unit **2** and by dispensing, even when the returned banknotes are recognized as abnormal in the first recognition processing, other banknotes stored in the first storage unit **2**.

In a case where the number of banknotes stored in the first storage unit **2** at the time when the dispensing processing ends is equal to or less than the first threshold value, on the other hand, the dispensing may not be completed by returning all banknotes stored in the temporary storage unit **13** to the first storage unit **2** when the returned banknotes are recognized as abnormal in the first recognition processing. In this case, even when other banknotes stored in the first storage unit **2** are dispensed, a dispensing amount may not be reached.

Accordingly, in a case where the number of banknotes stored in the first storage unit **2** at the time when the dispensing processing ends is equal to or less than the first threshold value, the control unit **15** causes all banknotes stored in the temporary storage unit **13** to be stored in the

second storage unit **3**, and excludes the banknotes from dispensing objects. After such processing, an operator is capable of replenishing the first storage unit **2** with banknotes based on the number of banknotes stored in the first storage unit **2** after the first storage processing. Accordingly, in the dispensing processing after the first storage processing, it is possible to suppress a situation in which the dispensing is not completed, and it is possible to suppress a decrease in the dispensing efficiency.

Next, a description will be given of a reason why it is possible to suppress a decrease in the dispensing efficiency in a case where the predetermined condition in the first storage processing is the condition **1-2**.

It is considered that banknotes stored in the temporary storage unit **13** comprise a predetermined proportion of banknotes that are recognized as normal in a case where the first recognition processing is performed again. Accordingly, in a case where the number of banknotes stored in the temporary storage unit **13** at the time when the dispensing processing ends exceeds the second threshold value, the temporary storage unit **13** highly likely comprises more banknotes that are recognized as normal in a case where the first recognition processing is performed again, in comparison with a case where the number of banknotes stored in the temporary storage unit **13** at the time when the dispensing processing ends is equal to or less than the second threshold value. Accordingly, a case where all banknotes stored in the temporary storage unit **13** are returned to the first storage unit **2** results in an increase in, of the returned banknotes, banknotes to be dispensed, and does not lead to a decrease in the dispensing efficiency.

In a case where the number of banknotes stored in the temporary storage unit **13** at the time when the dispensing processing ends is equal to or less than the second threshold value, on the other hand, the temporary storage unit **13** highly likely comprises fewer banknotes that are recognized as normal in a case where the first recognition processing is performed again, in comparison with a case where the number of banknotes stored in the temporary storage unit **13** exceeds the second threshold value. Accordingly, a case where all banknotes stored in the temporary storage unit **13** are returned to the first storage unit **2** may result in a decrease in, of the returned banknotes, banknotes to be dispensed, in comparison with a case where the number of banknotes stored in the temporary storage unit **13** exceeds the second threshold value. That is, banknotes recognized as abnormal in the first recognition processing may increase and the dispensing efficiency may decrease.

Accordingly, in a case where the number of banknotes stored in the temporary storage unit **13** at the time when the dispensing processing ends is equal to or less than the second threshold value, the control unit **15** causes all banknotes stored in the temporary storage unit **13** to be stored in the second storage unit **3**, and excludes the banknotes from dispensing objects. The control unit **15** performs such processing, and thus, it is possible to suppress a decrease in the dispensing efficiency.

Next, a description will be given of a reason why it is possible to suppress a decrease in the dispensing efficiency in a case where the predetermined condition in the second storage processing is the condition **1-3**.

The recognition unit **12** performs recognition processing of a banknote by using an image sensor or the like. However, even in a case where the same banknote is recognized, different recognition results may be obtained when a distance between the image sensor and a recognition part of the banknote varies. For example, a serial number, and tearing, soiling, perforation and the like of a banknote may be or may not be recognizable. Banknote warpage is considered to be a reason why the distance between the image sensor and the recognition part of a banknote varies.

For example, when a banknote passes through a bent part of a transport path, the banknote warps in accordance with the shape of the transport path. This banknote warpage gradually disappears as a transport distance on the transport path that is not bent increases.

When the first recognition processing is performed, a banknote is transported from the first storage unit **2** to the recognition unit **12** via the third transport path **413**, the rear reversing path **4113**, and the upper-side path **4111**. Since the direction in which the rear reversing path **4113** extends differs from the direction in which the upper-side path **4111** extends, the banknote warps when transported from the rear reversing path **4113** to the upper-side path **4111**. Thereafter, the banknote is transported on the upper-side path **4111** that horizontally extends, but may be subjected to the recognition by the recognition unit **12** in a state in which the warpage does not disappear since the transport distance to the recognition unit **12** is short.

When the second recognition processing is performed, on the other hand, a banknote is transported from the temporary storage unit **13** to the recognition unit **12** via the upper-side path **4111**. That is, the direction in which the banknote passes through the recognition unit **12** varies between the first recognition processing and the second recognition processing. Assuming that a banknote is bent when stored in the temporary storage unit **13**, the banknote is transported on the upper-side path **4111** that horizontally extends, and the transport distance to the recognition unit **12** is longer than that at a time of the first recognition processing. Accordingly, the banknote is highly likely subjected to recognition by the recognition unit **12** in a state in which the warpage is smaller than that at the time of the first recognition processing.

A case where banknote warpage at a time of the second recognition processing is smaller than that at the time of the first recognition processing may cause a situation in which the serial number that is not recognized in the first recognition processing is recognized in the second recognition processing. When such a situation occurs, the banknote reciprocates between the first storage unit **2** and the temporary storage unit **13** when the dispensing processing and the storage processing are performed, and the dispensing efficiency may decrease.

Accordingly, in a case where a factor in causing a banknote to be recognized as abnormal is an abnormality of a serial number ("serial number-unreadable"), the control unit **15** causes the banknote to be stored in the second recognition **3**, and excludes the banknote from dispensing objects. The control unit **15** performs such processing, and thus, it is possible to suppress a decrease in the dispensing efficiency.

The control unit **15** causes the second recognition processing to be performed on all banknotes stored in the temporary storage unit **13** regardless of whether the banknotes are banknotes for which the conditions **1-1**, **1-2**, and **1-3** are satisfied. Accordingly, there is no need to change the control of the recognition unit **12** depending on whether the banknotes are banknotes for which the conditions **1-1**, **1-2**, and **1-3** are satisfied.

The control unit **15** causes a banknote to pass through the upper-side path **4111**, the rear reversing path **4113**, and the lower-side path **4112** regardless of whether the banknote is a banknote for which the conditions **1-1**, **1-2**, and **1-3** are

satisfied. Accordingly, it is possible to suppress a decrease in the dispensing efficiency in a state in which a change in a banknote transport route is suppressed to the minimum.

Embodiment 2

(Configuration of Banknote Processing Apparatus)

Next, a configuration of a banknote processing apparatus in Embodiment 2 of the present disclosure will be described. FIG. **6** is a schematic diagram illustrating a configuration of an abnormal note list. Note that, a banknote processing apparatus **1**A in Embodiment 2 is an example of the banknote processing apparatus **1** of Embodiment 1. The same configurations as those of the banknote processing apparatus **1** of Embodiment 1 will be denoted by the same reference signs, and descriptions thereof will be simplified or omitted.

The banknote processing apparatus **1**A of Embodiment 2 and the banknote processing apparatus **1** of Embodiment 1 that are illustrated in FIG. **1** differ in that the banknote processing apparatus **1**A comprises a first storage unit **2**A instead of the first storage unit **2**, in that the banknote processing apparatus **1**A comprises a transport unit **4**A instead of the transport unit **4**, in the content of the abnormal note list stored in the memory unit **14**, and in the processing content of the control unit **15**.

As indicated by a solid line and a two-dot chain line in FIG. **1**, the first storage unit **2**A comprises a plurality of recycling storage apparatuses **21**. Note that, hereinafter, one of two recycling storage apparatuses **21** may be referred to as "first recycling storage apparatus **21**A", and the other thereof may be referred to as "second recycling storage apparatus **21**B". The denominations of banknotes that are stored in the first recycling storage apparatus **21**A and the second recycling storage apparatus **21**B are set differently in advance, respectively. Note that, at least one of the first recycling storage apparatus **21**A and the second recycling storage apparatus **21**B may be formed of a tape-type storing unit that uses a strip-shaped tape attached to the outer peripheral surface of a drum to wind a banknote on the drum together with the tape. Further, three or more recycling storage apparatuses **21** may form the first storage unit **2**A. In this case, the denominations of banknotes that are stored in the respective recycling storage apparatuses **21** preferably differ from each other.

The transport unit **4**A comprises the first transport path **411** to the third transport path **413** indicated by solid lines in FIG. **1**, and a fourth transport path **414** indicated by a two-dot chain line in FIG. **1**.

The third transport path **413** connects the lower-side path **4112** and the first recycling storage apparatus **21**A. The fourth transport path **414** connects the second recycling storage apparatus **21**B and a position of the lower-side path **4112**, where the position is on the rear side of a connection part between the lower-side path **4112** and the third transport path **413**. A connection part between the fourth transport path **414** and the lower-side path **4112** is provided with a third diverter mechanism. In the same manner as the first transport path **411** to the third transport path **413**, the fourth transport path **414** is formed of a combination of a roller, a belt, a motor, a sidewall, and the like. A tracking sensor(s) that detect(s) the passage of a banknote is/are provided at a predetermined position(s) of the fourth transport path **414**. The control unit **15** detects the position of a banknote based on detection signals from the tracking sensors, and controls the first diverter mechanism to the third diverter mechanism, thereby transporting the banknote to a predetermined configuration.

The memory unit **14** stores an abnormal note list **141**A as illustrated in FIG. **6**. The abnormal note list **141**A comprises abnormal note information **142**A corresponding to each banknote. The abnormal note information **142**A comprises the storage order information **143**, the abnormality factor information **144**, and feeding source information **145**A. The feeding source information **145**A indicates the recycling storage apparatus **21** (the first recycling storage apparatus **21**A or the second recycling storage apparatus **21**B) in which a banknote has been stored before the discharging processing starts.

(Operations of Banknote Processing Apparatus)

Next, operations of the banknote processing apparatus **1**A will be described. Note that, the dispensing processing as an example of the discharging processing and the second storage processing are the same as those in Embodiment 1. Accordingly, descriptions thereof will be omitted, and the first storage processing will be described. Note that, descriptions of the same processing as the first storage processing of Embodiment 1 will be simplified or omitted.

(1. First Storage Processing)

The first storage processing of Embodiment 2 and the first storage processing of Embodiment 1 are common except the following three points:

- Difference **2-1**: the content of the condition determination processing in step S**12**,
- Difference **2-2**: the content of the processing in step S**20**, and
- Difference **2-3**: in a case where it has been determined in step S**18** that a banknote remains in the temporary storage unit **13**, not the processing in step S**13** but the processing in step S**12** is performed.

The difference **2-1** will be described. In the condition determination processing in step S**12** illustrated in FIG. **5**, the control unit **15** determines whether conditions **2-1** and **2-2** described below are satisfied. In the condition determination processing, the control unit **15** may also determine only one of the conditions **2-1** and **2-2** or both the conditions. In the condition determination processing, the control unit **15** may use both the conditions **2-1** and **2-2** as determination objects, determine that the predetermined condition is satisfied in a case where one of the conditions of the determination objects is satisfied, and determine that the predetermined condition is not satisfied in a case where all the conditions of the determination objects are not satisfied.

The condition **2-1** is a condition related to a number of banknotes stored in the first storage unit **2**A. For example, the condition **2-1** is a condition that the number of banknotes stored in the recycling storage apparatus **21**, in which a banknote (a storage object banknote) that is to be fed out from the temporary storage unit **13** and is to be stored in the first storage unit **2**A or the second storage unit **3** has been originally (previously) stored, is equal to or less than a first threshold value at the time when the dispensing processing ends. Note that, the first threshold value in Embodiment 2 may be the same as or different from the first threshold value in Embodiment 1. Further, the condition **2-1** may also be a condition that the number of banknotes stored in the recycling storage apparatus **21** in which a storage object banknote has been originally stored is equal to or less than the first threshold value at a time when the storage object banknote is fed out.

When the condition determination processing in step S**12** is performed, the control unit **15** realizes, based on the abnormal note list **141**A, the recycling storage apparatus **21** (the first recycling storage apparatus **21**A or the second recycling storage apparatus **21**B) in which a banknote (a

storage object banknote) to be fed out from the temporary storage unit **13** has been originally stored. For example, in a case where the realized recycling storage apparatus **21** is the first recycling storage apparatus **21**A, the control unit **15** determines that the predetermined condition is satisfied when a number of banknotes stored in the first recycling storage apparatus **21**A at the time when the dispensing processing ends is equal to or less than the first threshold value, and the control unit **15** determines that the predetermined condition is not satisfied when the number of banknotes stored in the first recycling storage apparatus **21**A at the time when the dispensing processing ends exceeds the first threshold value.

The condition **2-2** is a condition related to the number of banknotes stored in the temporary storage unit **13**. For example, the condition **2-2** is a condition that, of banknotes stored in the temporary storage unit **13** at the time when the dispensing processing ends, a total number of banknotes having been stored in the recycling storage apparatus **21** that is the same recycling storage apparatus **21** in which a storage object banknote has been originally stored is equal to or less than a second threshold value. Note that, the second threshold value in Embodiment 2 may be the same as or different from the second threshold value in Embodiment 1. Further, the condition **2-2** may be a condition that the total number of banknotes having been stored in the recycling storage apparatus **21** that is the same recycling storage apparatus **21** in which a storage object banknote has been originally stored is equal to or less than the first threshold value at a time when the storage object banknote is fed out.

When the condition determination processing in step S**12** is performed, the control unit **15** realizes, based on the abnormal note list **141**A, the recycling storage apparatus **21** (the first recycling storage apparatus **21**A or the second recycling storage apparatus **21**B) in which a banknote that is to be fed out from the temporary storage unit **13** has been stored. For example, in a case where the realized recycling storage apparatus **21** is the first recycling storage apparatus **21**A, the control unit **15** determines that the predetermined condition is satisfied when, of banknotes stored in the temporary storage unit **13** at the time when the dispensing processing ends, a total number of banknotes having been stored in the first recycling storage apparatus **21**A is equal to or less than the second threshold value, and the control unit **15** determines that the predetermined condition is not satisfied when, of the banknotes stored in the temporary storage unit **13** at the time when the dispensing processing ends, the total number of banknotes having been stored in the first recycling storage apparatus **21**A exceeds the second threshold value.

The difference **2-2** will be described. In step S**20**, the control unit **15** causes a banknote determined as normal in the processing in step S**19** to be stored in the first recycling storage apparatus **21**A or the second recycling storage apparatus **21**B (the first storage unit **2**A) corresponding to the banknote.

The difference **2-3** will be described. In a case where it has been determined in step S**18** that a banknote remains in the temporary storage unit **13**, the control unit **15** performs the processing in step S**12** as indicated by the two-dot chain line in FIG. **5**. That is, in the first storage processing of Embodiment 1, it is determined by the condition determination processing of step S**12** performed once whether all banknotes stored in the temporary storage unit **13** are subjected to the second recognition processing in step S**19**, whereas in the first storage processing of Embodiment 2, the condition determination processing in step S**12** is performed a plurality of times, and it is determined whether each banknote stored in the temporary storage unit **13** is subjected to the second recognition processing in step S**19**.

(Working Effects of Embodiment 2)

Embodiment 2 described above exhibits, in addition to the same working effects as those exhibited by Embodiment 1, working effects as described below.

When the condition determination processing is performed, the control unit **15** realizes the recycling storage apparatus **21** in which a storage object banknote has been originally stored, the control unit **15** determines that the predetermined condition is satisfied when the number of banknotes stored in the realized recycling storage apparatus **21** at the time when the dispensing processing ends is equal to or less than the first threshold value, and the control unit **15** determines that the predetermined condition is not satisfied when the number of banknotes stored in the realized recycling storage apparatus **21** at the time when the dispensing processing ends exceeds the first threshold value. Further, when the condition determination processing is performed, the control unit **15** realizes the recycling storage apparatus **21** in which a storage object banknote has been stored, the control unit **15** determines that the predetermined condition is satisfied when, of banknotes stored in the temporary storage unit **13** at the time when the dispensing processing ends, the total number of banknotes having been stored in the realized recycling storage apparatus **21** is equal to or less than the second threshold value, and the control unit **15** determines that the predetermined condition is not satisfied when, of the banknotes stored in the temporary storage unit **13** at the time when the dispensing processing ends, the total number of banknotes having been stored in the realized recycling storage apparatus **21** exceeds the second threshold value. In these cases, it is possible to determine whether a banknote is excluded from dispensing objects for each denomination corresponding to each recycling storage apparatus **21**, and it is possible to suppress a decrease in the dispensing efficiency for each denomination.

Embodiment 3

(Configuration of Banknote Processing Apparatus)

Next, a configuration of a banknote processing apparatus in Embodiment 3 of the present disclosure will be described. FIG. **7** is a block diagram illustrating an overview of an internal configuration of the banknote processing apparatus. FIG. **8** is a schematic diagram illustrating a configuration of a serial number list. Note that, a banknote processing apparatus **1**B in Embodiment 3 is an example of the banknote processing apparatus **1** of Embodiment 1. The same configurations as those of the banknote processing apparatus **1** of Embodiment 1 or the banknote processing apparatus **1**A of Embodiment 2 will be denoted by the same reference signs, and descriptions thereof will be simplified or omitted.

The banknote processing apparatus **1**B of Embodiment 3 illustrated in FIG. **7** and the banknote processing apparatus **1**A of Embodiment 2 differ in that the banknote processing apparatus **1**B further comprises a depositing unit **16**, in that the banknote processing apparatus **1**B comprises a transport unit **4**B instead of the transport unit **4**, in the content of the list stored in the memory unit **14**, and in the processing content of the control unit **15**.

The depositing unit **16** is an example of an inlet section into which a banknote is inserted. The depositing unit **16** is a portion into which a banknote is inserted when depositing processing of a banknote is performed, for example. The depositing unit **16** is configured so as to be capable of

stacking a plurality of banknotes in an overlapping state. The depositing unit **16** comprises an inlet **161**, and a feeding mechanism. In the front portion of the housing **10** and rearward from the outlet **111**, the inlet **161** is provided to open upward. The feeding mechanism takes in (receives) a plurality of banknotes stacked in the depositing unit **16** one by one into the housing **10**.

The transport unit **4**B comprises the first transport path **411** to the fourth transport path **414** and a fifth transport path **415**.

The fifth transport path **415** connects the depositing unit **16** and a position of the upper-side path **4111**, where the position is on the rear side of a connection part between the upper-side path **4111** and the second transport path **412** and is on the front side of the recognition unit **12**. The fifth transport path **415** is provided so as to extend from the upper-side path **4111** frontward and obliquely upward (in a third direction), that is, so as to extend in a direction different from the direction in which the rear reversing path **4113** extends. A connection part between the fifth transport path **415** and the upper-side path **4111** is provided with a fourth diverter mechanism. In the same manner as in the first transport path **411** to the fourth transport path **414**, the fifth transport path **415** is formed of a combination of a roller, a belt, a motor, a sidewall, and the like. A tracking sensor(s) that detect(s) the passage of a banknote is/are provided at a predetermined position(s) of the fifth transport path **415**. The control unit **15** detects the position of a banknote based on detection signals from the tracking sensors, and controls the first diverter mechanism to the fourth diverter mechanism, thereby transporting the banknote to a predetermined configuration.

The memory unit **14** stores a serial number list **241**B as illustrated in FIG. **8** and the abnormal note list **141**A illustrated in FIG. **6**.

The serial number list **241**B is a list of banknotes recognized as normal by the recognition unit **12** when the depositing processing is performed. The memory unit **14** stores the serial number lists **241**B of the respective recycling storage apparatuses **21** forming the first storage unit **2**. That is, in Embodiment 3, the memory unit **14** stores the serial number list **241**B of the first recycling storage apparatus **21**A and the serial number list **241**B of the second recycling storage apparatus **21**B. The serial number list **241**B comprises banknote information **242**B corresponding to each banknote. For example, when one banknote is stored in the first recycling storage apparatus **21**A, the control unit **15** adds the banknote information **242**B corresponding to the banknote to the serial number list **241**B of the first recycling storage apparatus **21**A. For example, when one banknote is fed out from the first recycling storage apparatus **21**A, the control unit **15** deletes the banknote information **242**B corresponding to the banknote from the serial number list **241**B of the first recycling storage apparatus **21**A. The banknote information **242**B comprises storage order information **243**B and serial number information **244**B.

The storage order information **243**B indicates the order of storage of banknotes in the recycling storage apparatus **21**. The serial number information **244**B indicates the serial numbers of banknotes.

Note that, one serial number list **241**B may comprises the banknote information **242**B of the respective recycling storage apparatuses **21** forming the first storage unit **2**. In this case, the banknote information **242**B preferably comprises storage destination information indicating the recycling storage apparatus **21** (the first recycling storage apparatus **21**A or the second recycling storage apparatus **21**B) in which a banknote is stored.

Abnormality factors indicated by the abnormality factor information **144** of Embodiment 3 comprise "serial number-disagreement" that is one abnormality factor of a serial number. A case where an abnormality factor indicated by the abnormality factor information **144** is "serial number-disagreement" indicates that a serial number of a banknote recognized by the recognition unit **12** in the first recognition processing when the discharging processing is performed disagrees with a serial number of the serial number information **244**B in the banknote information **242**B corresponding to the banknote.

(Operations of Banknote Processing Apparatus)

Next, operations of the banknote processing apparatus **1**B will be described. In Embodiment 3, depositing processing is performed in addition to the dispensing processing as an example of the discharging processing, the first storage processing, and the second storage processing that are performed in Embodiment 2. Regarding the dispensing processing, the first storage processing, and the second storage processing, only differences thereof between Embodiment 3 and Embodiments 1 and 2 will be described.

(1. Depositing Processing)

First, the depositing processing will be described. When the control unit **15** realizes a banknote depositing instruction by an operator based on an operation signal from the operation unit, the control unit **15** controls the feeding mechanism of the depositing unit **16** such that one banknote is fed out from the depositing unit **16**.

The control unit **15** controls the transport unit **4**B such that the banknote is transported to the recognition unit **12** via the fifth transport path **415** and the upper-side path **4111**, and the recognition unit **12** performs third recognition processing. The content of the third recognition processing is the same as those of the first recognition processing and the second recognition processing. The direction in which the banknote passes through the recognition unit **12** varies between the first recognition processing and the third recognition processing. The control unit **15** determines whether the banknote recognized in the third recognition processing is normal.

In a case where it has been determined that the banknote is a normal note, the control unit **15** controls the transport unit **4**B and the first storage unit **2**A such that the banknote is stored in the first storage unit **2**A (the first recycling storage apparatus **21**A or the second recycling storage apparatus **21**B) corresponding to the banknote. For example, the control unit **15** causes the banknote to pass through at least the upper-side path **4111**, the rear reversing path **4113** and the lower-side path **4112** and to be stored in the first recycling storage apparatus **21**A. The control unit **15** adds the banknote information **242**B of the banknote recognized as normal based on a result of the third recognition processing to the serial number list **241**B.

In a case where it has been determined in the third recognition processing that the banknote is an abnormal note, on the other hand, the control unit **15** controls the transport unit **4**B such that the banknote is dispensed from the dispensing unit **11**.

The control unit **15** repeats the processing to cause a banknote to be stored in the first storage unit **2**A or the second storage unit **3** based on a result of the third recognition processing until there is no banknote in the depositing unit **16**. Note that, the control unit **15** may cause a banknote determined as normal in the third recognition processing to

be stored in the temporary storage unit **13**. After there is no banknote in the depositing unit **16** and a depositing amount is accepted, the control unit **15** causes a banknote stored in the temporary storage unit **13** to be stored in the first storage unit **2**A (the first recycling storage apparatus **21**A or the second recycling storage apparatus **21**B) corresponding to the banknote.

(2. Dispensing Processing)

Next, the dispensing processing will be described. The dispensing processing of Embodiment 3 and the dispensing processing of Embodiments 1 and 2 are common except the following three points:

- Difference **3-1**: in the first recognition processing in step S**3**, it is recognized whether a serial number of a banknote recognized by the recognition unit **12** agrees with a serial number of the serial number information **244**B in the banknote information **242**B corresponding to the banknote,
- Difference **3-2**: after the first recognition processing in step S**3**, the banknote information **242**B corresponding to a dispensed banknote is deleted from the serial number list **241**B (after the first recognition processing on a predetermined banknote is performed, the banknote information **242**B corresponding to the predetermined banknote may be deleted before the first recognition processing on the next banknote is performed, or after dispensing of banknotes in a dispensing amount is completed, the banknote information **242**B corresponding to all the dispensed banknotes may be deleted altogether), and
- Difference **3-3**: in step S**8**, the abnormal note information **142** in which the content of the abnormality factor information **144** is "serial number-disagreement" is added to the abnormal note list **141** based on a result of the first recognition processing.

Here, a matter deemed to be a factor in causing an abnormality of "serial number-disagreement" will be described. When the third recognition processing is performed, a banknote is transported from the depositing unit **16** to the recognition unit **12** via the fifth transport path **415** and the upper-side path **4111**. Since the direction in which the fifth transport path **415** extends differs from the direction in which the upper-side path **4111** extends, the banknote warps when transported from the fifth transport path **415** to the upper-side path **4111**. At this time, the banknote warps in the opposite direction to the direction when the first recognition processing is performed. That is, the direction in which the banknote warps when transported from the fifth transport path **415** extending in the third direction to the upper-side path **4111** extending in the first direction differs from the direction in which the banknote warps when transported from the rear reversing path **4113** extending in the second direction to the upper-side path **4111** extending in the first direction. Thus, in a case where the warpage direction of a banknote varies between when the first recognition processing is performed and when the third recognition processing is performed, the distance from the position of the serial number to the recognition unit **12** also varies. Consequently, a recognition result of a serial number may vary between the first recognition processing and the third recognition processing.

Note that, the control unit **15** may also determine that an abnormality of "serial number-disagreement" does not occur in a case where a serial number of a banknote recognized in the first recognition processing disagrees with a serial number in the banknote information **242**B corresponding to the banknote by a number of digits that is equal to or less than a number of digits set in advance. Even in a case where a serial number of a banknote recognized in the first recognition processing disagrees with a serial number in the banknote information **242**B corresponding to the banknote, the control unit **15** may determine that an abnormality of "serial number-disagreement" does not occur when the serial number of the banknote recognized in the first recognition processing agrees with a serial number in the banknote information **242**B corresponding to another banknote. Although the dispensing processing has been described thus far as an example of the discharging processing, the banknote movement is the same in the case of collection processing. For example, operations of the collection processing can be understood by replacing the dispensing amount described above with a collection amount or a number of collected banknotes.

(3. First Storage Processing and Second Storage Processing)

Next, the first storage processing and the second storage processing will be described. The first storage processing of Embodiment 3 and the first storage processing of Embodiments 1 and 2 are common except a difference **3-4** described below. Further, the second storage processing of Embodiment 3 and the second storage processing of Embodiments 1 and 2 are common except differences **3-4** and **3-5** described below.

- Difference **3-4**: the banknote information **242**B corresponding to a stored banknote is added to the serial number list **241**B in step S**20**, and
- Difference **3-5**: the content of the condition determination processing in step S**12**.

The difference **3-5** will be described. In the condition determination processing in step S**12**, the control unit **15** determines whether the condition **1-3** described above or a condition **1-4** described below is satisfied.

The condition **1-4** is a condition related to a factor in causing a banknote to be recognized as abnormal in the first recognition processing. The condition **1-4** is a condition that a factor in causing a banknote to be recognized as abnormal is an abnormality of a serial number ("serial number-unreadable" or "serial number-disagreement"). In a case where an abnormality of a banknote is "serial number-unreadable" or "serial number-disagreement", the control unit **15** determines that the storage object banknote is a banknote for which the predetermined condition is satisfied. In a case where an abnormality of a banknote is an abnormality other than "serial number-unreadable" and "serial number-disagreement", the control unit **15** determines that the storage object banknote is a banknote for which the predetermined condition is not satisfied.

(Working Effects of Embodiment 3)

Embodiment 3 described above exhibits the same working effects as those exhibited by Embodiments 1 and 2.

Embodiment 4

Next, Embodiment 4 of the present disclosure will be described. A configuration of a banknote processing apparatus in Embodiment 4 of the present disclosure will be described. FIG. **9** is a block diagram illustrating an overview of an internal configuration of the banknote processing apparatus. Note that, a banknote processing apparatus **1**C in Embodiment 4 is an example of the banknote processing apparatus **1** of Embodiment 1. The same configurations as those of the banknote processing apparatuses **1**, **1**A and **1**B

of Embodiments 1 to 3 will be denoted by the same reference signs, and descriptions thereof will be simplified or omitted.

The banknote processing apparatus **1**C illustrated in FIG. **9** comprises the housing **10** that comprises a lower housing **10**A and an upper housing **10**B. The lower housing **10**A has a structure as a safe. The lower housing **10**A is configured such that only authorized people such as a manager are allowed to set a first storage unit **2**C to be described later and the second storage unit **3** in the lower housing **10**A and to take out the first storage unit **2**C and the second storage unit **3** from the lower housing **10**A by opening a door. The upper housing **10**B is disposed on the lower housing **10**A.

The banknote processing apparatus **1**C further comprises the depositing unit **16**, the dispensing unit **11**, the recognition unit **12**, the first storage unit **2**C, the second storage unit **3**, the temporary storage unit **13**, the transport unit **5**, the memory unit **14**, and the control unit **15**. The depositing unit **16**, the dispensing unit **11**, the recognition unit **12**, the temporary storage unit **13**, the memory unit **14**, and the control unit **15** are provided in the upper housing **10**B. The first storage unit **2**C and the second storage unit **3** are provided in the lower housing **10**A. The transport unit **5** is configured so as to be capable of transporting a banknote between the lower housing **10**A and the upper housing **10**B. At least one of the memory unit **14** and the control unit **15** may also be provided in the lower housing **10**A.

The first storage unit **2**C comprises a plurality of recycling storage apparatuses **21**. In the present Embodiment 4, the first storage unit **2**C comprises four recycling storage apparatuses **21**. Note that, hereinafter, the four recycling storage apparatuses **21** may be referred to as "first recycling storage apparatus **21**A", "second recycling storage apparatus **21**B", "third recycling storage apparatus **21**C", and "fourth recycling storage apparatus **21**D", respectively. The denominations of banknotes that are stored in the first recycling storage apparatus **21**A to the fourth recycling storage apparatus **21**D are set differently in advance. Note that, at least one of the first recycling storage apparatus **21**A to the fourth recycling storage apparatus **21**D may be formed of a tape-type storing unit that uses a strip-shaped tape attached to the outer peripheral surface of a drum to wind a banknote on the drum together with the tape. Further, five or more recycling storage apparatuses **21** may form the first storage unit **2**C, and the denominations of banknotes that are stored in the respective recycling storage apparatuses **21** preferably differ from each other.

The transport unit **5** comprises an upper-side transport unit **51** and a lower-side transport unit **52**. The upper-side transport unit **51** is provided in the upper housing **10**B. The lower-side transport unit **52** is provided in the lower housing **10**A.

The upper-side transport unit **51** comprises a first transport path **511**, a second transport path **512**, a third transport path **513**, a fourth transport path **514**, a fifth transport path **515**, and a sixth transport path **516**.

The first transport path **511** is formed in a loop shape. The first transport path **511** comprises an upper-side path **5111** extending longitudinally, a lower-side path **5112** extending longitudinally below the upper-side path **5111**, a rear reversing path **5113** connecting the upper-side path **5111** and the lower-side path **5112** on the rear side, and a front reversing path **5114** connecting the upper-side path **5111** and the lower-side path **5112** on the front side. The upper-side path **5111** is provided with the recognition unit **12**. The recognition unit **12** is provided at a position at which a distance L**1** of a part (straight part) of the upper-side path **5111**, where the part extends in the horizontal direction from the front end of the recognition unit **12** to the temporary storage unit **13**, is longer than a distance L**2** of a part (straight part) of the upper-side path **5111**, where the part extends in the horizontal direction from the rear end of the recognition unit **12** to the rear reversing path **5113**.

The second transport path **512** connects the dispensing unit **11** and a position of the upper-side path **5111**, where the position is on the front side of the recognition unit **12**. A connection part between the second transport path **512** and the upper-side path **5111** is provided with a first diverter mechanism.

The third transport path **513** connects the depositing unit **16** and a position of the upper-side path **5111**, where the position is on the rear side of the first diverter mechanism. A connection part between the third transport path **513** and the upper-side path **5111** is provided with a second diverter mechanism.

The fourth transport path **514** connects the front reversing path **5114** and the temporary storage unit **13**. A connection part between the fourth transport path **514** and the front reversing path **5114** is provided with a third diverter mechanism.

The fifth transport path **515** connects the front reversing path **5114** and the lower-side transport unit **52**. The fifth transport path **515** and the lower-side transport unit **52** are connected via a transport path penetrating the lower housing **10**A. A connection part between the fifth transport path **515** and the front reversing path **5114** is provided with a fourth diverter mechanism.

The sixth transport path **516** connects the lower-side path **5112** and the lower-side transport unit **52**. The sixth transport path **516** and the lower-side transport unit **52** are connected via a transport path penetrating the lower housing **10**A. A connection part between the sixth transport path **516** and the lower-side path **5112** is provided with a fifth diverter mechanism.

The lower-side transport unit **52** comprises a seventh transport path **521**, an eighth transport path **522**, a ninth transport path **523**, a tenth transport path **524**, and an eleventh transport path **525**.

The seventh transport path **521** connects the fifth transport path **515** and the second storage unit **3**.

The eighth transport path **522** connects the sixth transport path **516** and the first recycling storage apparatus **21**A.

The ninth transport path **523** connects the eighth transport path **522** and the second recycling storage apparatus **21**B. A connection part between the ninth transport path **523** and the eighth transport path **522** is provided with a sixth diverter mechanism.

The tenth transport path **524** connects the third recycling storage apparatus **21**C and a position of the eighth transport path **522**, where the position is on the front side of the sixth diverter mechanism. A connection part between the tenth transport path **524** and the eighth transport path **522** is provided with a seventh diverter mechanism.

The eleventh transport path **525** connects the fourth recycling storage apparatus **21**D and a position of the eighth transport path **522**, where the position is on the front side of the seventh diverter mechanism. A connection part between the eleventh transport path **525** and the eighth transport path **522** is provided with an eighth diverter mechanism.

The first transport path **511** to the sixth transport path **516** and the seventh transport path **521** to the eleventh transport path **525** are each formed of a combination of a roller, a belt wound on the roller, a motor that drives the roller, a sidewall, and the like. Tracking sensors that detect the passage of a

banknote are provided at predetermined positions of the first transport path **511** to the sixth transport path **516** and the seventh transport path **521** to the eleventh transport path **525**. The control unit **15** detects the position of a banknote based on detection signals from the tracking sensors, and controls the first diverter mechanism and the eighth diverter mechanisms, thereby transporting the banknote to a predetermined configuration.

The memory unit **14** stores the serial number list **241**B as illustrated in FIG. **8** and the abnormal note list **141**A illustrated in FIG. **6**.

(Operations of Banknote Processing Apparatus)

Next, operations of the banknote processing apparatus **1**C will be described. In Embodiment 4, depositing processing, dispensing processing as an example of the discharging processing, first storage processing, and second storage processing that are the same as those in Embodiment 3 are performed. Here, descriptions will be given mainly of differences of each processing between Embodiments 3 and 4.

(1. Depositing Processing)

First, the depositing processing will be described. When the control unit **15** realizes a banknote depositing instruction by an operator, the control unit **15** causes one banknote stacked in the depositing unit **16** to be transported to the recognition unit **12** via the third transport path **513** and the upper-side path **5111**, and the recognition unit **12** performs the third recognition processing.

The control unit **15** causes the banknote determined as a normal note based on a result of the third recognition processing to pass through at least the upper-side path **5111**, the rear reversing path **5113**, the lower-side path **5112**, the sixth transport path **516**, and the eighth transport path **522** and to be stored in the recycling storage apparatus **21** (one of the first recycling storage apparatus **21**A to the fourth recycling storage apparatus **21**D (the first storage unit **2**C)) corresponding to the banknote. The control unit **15** adds the banknote information **242**B of the banknote recognized as normal based on the result of the third recognition processing to the serial number list **241**B.

The control unit **15**, on the other hand, causes the banknote determined as abnormal based on a result of the third recognition processing to pass through the upper-side path **5111**, the rear reversing path **5113**, the lower-side path **5112**, the front reversing path **5114**, and the second transport path **512**, and to be dispensed from the dispensing unit **11**. The control unit **15** repeats the processing to cause a banknote to be stored in the first storage unit **2**C or the second storage unit **3** based on a result of the third recognition processing until there is no banknote in the depositing unit **16**. Note that, the control unit **15** may cause a banknote determined as normal in the third recognition processing to be stored in the temporary storage unit **13**. After there is no banknote in the depositing unit **16** and a depositing amount is accepted, the control unit **15** causes a banknote stored in the temporary storage unit **13** to be stored in the recycling storage apparatus **21** (one of the first recycling storage apparatus **21**A to the fourth recycling storage apparatus **21**D (the first storage unit **2**C)) corresponding to the banknote.

(2. Dispensing Processing)

Next, the dispensing processing will be described. The control unit **15** performs the processing in steps S**1** to S**8** illustrated in FIG. **4**. In step S**2**, the control unit **15** causes a banknote to be fed out from the recycling storage apparatus **21** (one of the first recycling storage apparatus **21**A to the fourth recycling storage apparatus **21**D (the first storage unit **2**C)) corresponding to the banknote to be dispensed. In step S**3**, the control unit **15** causes the banknote to be transported to the recognition unit **12** via at least the eighth transport path **522**, the sixth transport path **516**, the lower-side path **5112**, the rear reversing path **5113**, and the upper-side path **5111**, and causes the recognition unit **12** to perform the first recognition processing (step S**3**).

In step S**5**, the control unit **15** causes the banknote recognized as normal in the first recognition processing to pass through the upper-side path **5111**, the front reversing path **5114**, and the second transport path **512** and to be dispensed from the dispensing unit **11**. In step S**7**, the control unit **15** causes the banknote recognized as abnormal in the first recognition processing to pass through the upper-side path **5111**, the front reversing path **5114**, and the fourth transport path **514** and to be stored in the temporary storage unit **13**.

(3. Storage Processing)

Next, the storage processing will be described. The control unit **15** performs the processing in steps S**11** to S**20** illustrated in FIG. **5** as the first storage processing or the second storage processing.

In the first storage processing, the control unit **15** determines in the condition determination processing in step S**12** whether the conditions **2-1** and **2-2** are satisfied. The control unit **15** may determine only one of the conditions **2-1** and **2-2** or both the conditions.

The condition **2-1** is a condition related to a number of banknotes stored in the first storage unit **2**C. For example, the condition **2-1** is a condition that the number of banknotes stored in the recycling storage apparatus **21** in which a storage object banknote has been stored is equal to or less than the first threshold value at the time when the dispensing processing ends.

The control unit **15** realizes the recycling storage apparatus **21** (one of the first recycling storage apparatus **21**A to the fourth recycling storage apparatus **21**D (the first storage unit **2**C)) in which the storage object banknote has been stored, the control unit **15** determines that the predetermined condition is satisfied when the number of banknotes stored in the realized recycling storage apparatus **21** at the time when the dispensing processing ends is equal to or less than the first threshold value, and the control unit **15** determines that the predetermined condition is not satisfied when the number of banknotes stored in the realized recycling storage apparatus **21** at the time when the dispensing processing ends exceeds the first threshold value.

The condition **2-2** is a condition related to the number of banknotes stored in the temporary storage unit **13**. For example, the condition **2-2** is a condition that, of banknotes stored in the temporary storage unit **13** at the time when the dispensing processing ends, the total number of banknotes having been stored in the recycling storage apparatus **21** that is the same recycling storage apparatus **21** in which a storage object banknote has been stored is equal to or less than the second threshold value.

The control unit **15** realizes the recycling storage apparatus **21** (one of the first recycling storage apparatus **21**A to the fourth recycling storage apparatus **21**D (the first storage unit **2**C)) in which the storage object banknote has been stored, the control unit **15** determines that the predetermined condition is satisfied when, of banknotes stored in the temporary storage unit **13** at the time when the dispensing processing ends, the total number of banknotes having been stored in the realized recycling storage apparatus **21** is equal to or less than the second threshold value, and the control unit **15** determines that the predetermined condition is not satisfied when, of the banknotes stored in the temporary storage unit **13** at the time when the dispensing processing

ends, the total number of banknotes having been stored in the realized recycling storage apparatus **21** exceeds the second threshold value.

In the first storage processing, in a case where it has been determined in step S**18** that a banknote remains in the temporary storage unit **13**, the control unit **15** performs the processing in step S**12**.

In the first storage processing and the second storage processing, in step S**15**, the control unit **15** causes the banknote to be transported to the recognition unit **12** via the fourth transport path **514**, the front reversing path **5114**, and the upper-side path **5111**, and causes the recognition unit **12** to perform the second recognition processing. In step S**17**, the control unit **15** causes a banknote in a case where it has been determined that the predetermined condition is satisfied or a banknote recognized as abnormal in the second recognition processing to pass through the upper-side path **5111**, the rear reversing path **5113**, the lower-side path **5112**, the front reversing path **5114**, and the fourth transport path **514** and to be stored in the temporary storage unit **13**. In step S**20**, the control unit **15** causes the banknote recognized as abnormal in the second recognition processing to pass through at least the upper-side path **5111**, the rear reversing path **5113**, the lower-side path **5112**, the sixth transport path **516**, and the eighth transport path **522** and to be stored in the recycling storage apparatus **21** (one of the first recycling storage apparatus **21**A to the fourth recycling storage apparatus **21**D (the first storage unit **2**C)) corresponding to banknote.

(Working Effects of Embodiment 4)

Embodiment 4 described above exhibits the same working effects as those exhibited by Embodiments 1 to 3.

VARIATIONS OF EMBODIMENTS

It goes without saying that the present disclosure is not limited to those indicated in the embodiments described thus far, and various modifications can be made without departing from the spirit of the present disclosure. The embodiments described above and variations indicated below, in so far as applicable, may be combined in any way.

Variation 1

The storage processing in Embodiments 1 to 4 may also be performed based on a flowchart illustrated in FIG. **10**. After the processing in steps S**11** to S**14**, the control unit **15** determines whether it has been determined in the condition determination processing that the predetermined condition is satisfied (step S**16**). In a case where it has been determined that the predetermined condition is not satisfied (step S**16**: NO), the control unit **15** causes a banknote to be transported to the recognition unit **12** and causes the recognition unit **12** to perform the second recognition processing (step S**15**). In step S**19** subsequent thereto, the control unit **15** causes a banknote, whose result of the second recognition processing has been determined as normal, to be stored in the first storage unit **2**, **2**A or **2**C (step S**20**). The control unit **15** causes a banknote, whose result of the second recognition processing has been determined as abnormal in step S**19**, to be stored in the second storage unit **3** (step S**17**), and performs the processing in step S**18**.

In a case where it has been determined that the predetermined condition is satisfied (step S**16**: YES), the control unit **15** does not perform the second recognition processing on the banknote, but causes the banknote to be stored in the second storage unit **3** (step S**17**). Here, since it has been determined that the predetermined condition is satisfied, the following two transport routes of the banknote are conceivable in a case where the second recognition processing is not performed but the banknote is stored in the second storage unit **3**.

A first transport route is a route that causes a banknote to pass through the recognition unit **12** in the same manner as in a case where it has been determined that the predetermined condition is not satisfied. In this case, when the banknote passes through the recognition unit **12** after it has been determined that the predetermined condition is not satisfied, the control unit **15** does not allow the recognition unit **12** to perform the second recognition processing.

A second transport route is a route that does not allow a banknote to pass through the recognition unit **12**. For example, in the banknote processing apparatus **1**C of Embodiment 4, the control unit **15** causes a banknote to pass through the second transport route formed of the fourth transport path **514**, the front reversing path **5114**, the fifth transport path **515**, and the seventh transport path **521** and to be stored in the second storage unit **3** as indicated by an arrow R**2**. Further, in the banknote processing apparatuses **1**, **1**A and **1**B of Embodiments 1 to 3, a front reversing path **4114** as indicated by a two-dot chain line in FIG. **1** and FIG. **7** may be further provided, and the control unit **15** may cause a banknote to pass through the second transport route formed of the upper-side path **4111**, the front reversing path **4114**, and the lower-side path **4112** and to be stored in the second storage unit **3** as indicated by the arrow R**2**.

Variation 2

In Embodiments 1 to 4, dispensing processing illustrated in FIG. **11** and storage processing illustrated in FIG. **12** may also be performed.

First, the dispensing processing will be described. As illustrated in FIG. **11**, the control unit **15** performs the processing in steps S**1** to S**4**. The control unit **15** causes a banknote determined as normal in step S**4** to be dispensed from the dispensing unit **11** (step S**5**), and performs the processing in step S**6**. The processing up to this point is the same as the dispensing processing of Embodiments 1 to 4.

The control unit **15** performs the condition determination processing on a banknote determined as abnormal in step S**4** (step S**31**).

In the condition determination processing, the control unit **15** determines whether a predetermined condition is satisfied. As the predetermined condition, it is possible to exemplify a condition **5-1** and a condition **5-2** described below. In the condition determination processing, the control unit **15** may determine only one of the conditions **5-1** and **5-2** or both the conditions. In the condition determination processing, the control unit **15** may use both the conditions **5-1** and **5-2** as determination objects, determine that the predetermined condition is satisfied in a case where one of the conditions of the determination objects is satisfied, and determine that the predetermined condition is not satisfied in a case where all the conditions of the determination objects are not satisfied.

The condition **5-1** is a condition related to a number of banknotes stored in the first storage units **2**, **2**A and **2**C. For example, the condition **5-1** is a condition that the number of banknotes stored in the first storage units **2**, **2**A and **2**C at a time when the dispensing processing starts or immediately before a storage object banknote is fed out is equal to or less than the first threshold value. In a case where the number of banknotes stored in the first storage units **2**, **2**A and **2**C is

equal to or less than the first threshold value, the control unit **15** determines that the predetermined condition is satisfied. In a case where the number of banknotes stored in the first storage units **2**, **2**A and **2**C exceeds the first threshold value, the control unit **15** determines that the predetermined condition is not satisfied.

Here, in a case where the banknote processing apparatus **1** of Embodiment 1 is used, the condition **5-1** is a condition that a number of banknotes stored in one recycling storage apparatus **21** is equal to or less than the first threshold value. When the banknote processing apparatuses **1**A, **1**B and **1**C of Embodiments 2 to 4 are used, the condition **5-1** may be a condition that, of a plurality of recycling storage apparatuses **21**, a number of banknotes stored in the recycling storage apparatus **21** in which a storage object banknote has been stored is equal to or less than the first threshold value, or may be a condition that a total number of banknotes in the plurality of recycling storage apparatuses **21** is equal to or less than the first threshold value.

The condition **5-2** is a condition related to a factor in causing a banknote to be recognized as abnormal in the first recognition processing. For example, the condition **5-2** is a condition that the factor in causing a banknote to be recognized as abnormal is an abnormality of a serial number. In a case where an abnormality of a banknote is an abnormality of a serial number, the control unit **15** determines that the storage object banknote is a banknote for which the predetermined condition is satisfied. In a case where an abnormality of a banknote is an abnormality other than an abnormality of a serial number, the control unit **15** determines that the storage object banknote is a banknote for which the predetermined condition is not satisfied.

Here, in a case where the banknote processing apparatus **1** of Embodiment 1 is used, an abnormality of a serial number in the condition **5-2** is "serial number-unreadable". In a case where the banknote processing apparatuses **1**A, **1**B and **1**C according to Embodiments 2 to 4 are used, an abnormality of a serial number in the condition **5-2** is "serial number-unreadable" or "serial number-disagreement".

After the processing in step S**31**, the control unit **15** determines whether it has been determined that the predetermined condition is satisfied for a banknote (step S**32**). In a case where it has been determined that the predetermined condition is satisfied for the banknote (step S**32**: YES), the control unit **15** causes the banknote to be stored in the second storage unit **3** (step S**33**), and performs the processing in step S**2**.

In a case where it has been determined that the predetermined condition is not satisfied for the banknote (step S**32**: NO), the control unit **15** causes the banknote to be stored in the temporary storage unit **13** (step S**7**). The control unit **15** adds the abnormal note information **142** of the banknote recognized as abnormal to the abnormal note list **141** (step S**8**), and performs the processing in step S**2**.

Next, the storage processing will be described. As illustrated in FIG. **12**, the control unit **15** performs the processing in step S**11**. In a case where it has been determined that no banknote is stored in the temporary storage unit **13** (step S**11**: NO), the control unit **15** ends the storage processing. In a case where it has been determined that a banknote is stored in the temporary storage unit **13** (step S**11**: YES), the control unit **15** performs the processing in steps S**13** to S**15** in the same manner as in the storage processing of Embodiments 1 to 4.

After the processing in step S**15** (the second recognition processing), the control unit **15** determines whether a result of the second recognition processing is normal (step S**19**). In a case where it has been determined that the result of the second recognition processing is normal (step S**19**: YES), the control unit **15** causes the banknote to be stored in the first storage unit **2**, **2**A or **2**C (the recycling storage apparatus **21** corresponding to the banknote) (step S**20**), and performs the processing in step S**18**. In a case where it has been determined that the result of the second recognition processing is abnormal (step S**19**: NO), the control unit **15** causes the banknote to be stored in the second storage unit **3** (step S**17**), and performs the processing in step S**18**.

Even in Variation 2 described above, it is possible to suppress a decrease in the dispensing efficiency in the same manner as in Embodiments 1 to 4.

Other Variations

In Embodiments 1 to 4 and Variations 1 and 2, the conditions **1-3** and **5-2** related to a factor in causing a banknote to be recognized as abnormal in the first recognition processing may be an abnormality other than an abnormality of a serial number, for example, tearing, soiling, and perforation of a banknote.

In Embodiments 2 to 4 and Variation 1, a condition that a total number of banknotes stored in all recycling storage apparatuses **21** forming the first storage unit **2**A or **2**C at a time when the dispensing processing or the collection processing ends is equal to or less than the first threshold value may be applied as the condition **2-1**. Further, a condition that the number of banknotes stored in the temporary storage unit **13** at the time when the dispensing processing or the collection processing ends is equal to or less than the second threshold value may be applied as the condition **2-2**. In these cases, in a case where it has been determined in step S**18** that a banknote remains in the temporary storage unit **13**, the processing in step S**13** is preferably performed as indicated by a solid line in FIG. **5**.

As sheets to be processed with the sheet processing apparatus of the present disclosure, coupons and checks may also be applied.

FIG. **13** is a block diagram of processing circuitry that performs computer-based operations in accordance with the present disclosure. FIG. **13** illustrates processing circuitry **300** of control unit **15**, which is a component of banknote processing apparatus **1**.

Processing circuitry **300** is used to control any computer-based and cloud-based control processes, descriptions or blocks in flowcharts can be understood as representing modules, segments or portions of code which include one or more executable instructions for implementing specific logical functions or steps in the process, and alternate implementations are included within the scope of the exemplary embodiments of the present advancements in which functions can be executed out of order from that shown or discussed, including substantially concurrently or in reverse order, depending upon the functionality involved, as would be understood by those skilled in the art. The functionality of the elements disclosed herein may be implemented using circuitry or processing circuitry which may include general purpose processors, special purpose processors, integrated circuits, ASICs ("Application Specific Integrated Circuits"), conventional circuitry and/or combinations thereof which are configured or programmed to perform the disclosed functionality. Processors are processing circuitry or circuitry as they include transistors and other circuitry therein. The processor may be a programmed processor which executes a program stored in a memory. In the disclosure, the processing circuitry, units, or means are hardware that carry out

or are programmed to perform the recited functionality. The hardware may be any hardware disclosed herein or otherwise known which is programmed or configured to carry out the recited functionality.

In FIG. **13**, the processing circuitry **300** includes a CPU **301** which performs one or more of the control processes discussed in this disclosure. The process data and instructions may be stored in memory **302**. These processes and instructions may also be stored on a storage medium disk **304** such as a hard drive (HDD) or portable storage medium or may be stored remotely. Further, the claimed advancements are not limited by the form of the computer-readable media on which the instructions of the inventive process are stored. For example, the instructions may be stored on CDs, DVDs, in FLASH memory, RAM, ROM, PROM, EPROM, EEPROM, hard disk or any other non-transitory computer readable medium of an information processing device with which the processing circuitry **300** communicates, such as a server or computer. The processes may also be stored in network based storage, cloud-based storage or other mobile accessible storage and executable by processing circuitry **300**.

Further, the claimed advancements may be provided as a utility application, background daemon, or component of an operating system, or combination thereof, executing in conjunction with CPU **301** and an operating system such as Microsoft Windows, UNIX, Solaris, LINUX, Apple MAC-OS, Apple iOS and other systems known to those skilled in the art.

The hardware elements in order to achieve the processing circuitry **300** may be realized by various circuitry elements. Further, each of the functions of the above described embodiments may be implemented by circuitry, which includes one or more processing circuits. A processing circuit includes a particularly programmed processor, for example, processor (CPU) **301**, as shown in FIG. **13**. A processing circuit also includes devices such as an application specific integrated circuit (ASIC) and conventional circuit components arranged to perform the recited functions.

In FIG. **13**, the processing circuitry **300** may be a computer or a particular, special-purpose machine. Processing circuitry **300** is programmed to execute processing to control banknote processing apparatus **1**.

Alternatively, or additionally, the CPU **301** may be implemented on an FPGA, ASIC, PLD or using discrete logic circuits, as one of ordinary skill in the art would recognize. Further, CPU **301** may be implemented as multiple processors cooperatively working in parallel to perform the instructions of the inventive processes described above.

The processing circuitry **300** in FIG. **13** also includes a network controller **306**, such as an Ethernet PRO network interface card, for interfacing with network **550**. As can be appreciated, the network **550** can be a public network, such as the Internet, or a private network such as a local area network (LAN) or wide area network (WAN), or any combination thereof and can also include Public Switched Telephone Network (PSTN) or Integrated Services Digital Network (ISDN) sub-networks. The network **550** can also be wired, such as an Ethernet network, universal serial bus (USB) cable, or can be wireless such as a cellular network including EDGE, 3G and 4G wireless cellular systems. The wireless network can also be Wi-Fi, wireless LAN, Bluetooth, or any other wireless form of communication that is known. Additionally, network controller **306** may be compliant with other direct communication standards, such as Bluetooth, a near field communication (NFC), infrared ray or other.

The processing circuitry **300** further includes a display controller **308**, such as a graphics card or graphics adaptor for interfacing with display **309**, such as a monitor. An I/O interface **312** interfaces with a keyboard and/or mouse **314** as well as a touch screen panel **316** on or separate from display **109**. I/O interface **312** also connects to a variety of peripherals **318**.

The storage controller **324** connects the storage medium disk **304** with communication bus **326**, which may be an ISA, EISA, VESA, PCI, or similar, for interconnecting all of the components of the processing circuitry **300**. A description of the general features and functionality of the display **309**, keyboard and/or mouse **314**, as well as the display controller **308**, storage controller **324**, network controller **306**, and I/O interface **312** is omitted herein for brevity as these features are known.

The exemplary circuit elements described in the context of the present disclosure may be replaced with other elements and structured differently than the examples provided herein. Moreover, circuitry configured to perform features described herein may be implemented in multiple circuit units (e.g., chips), or the features may be combined in circuitry on a single chipset.

The functions and features described herein may also be executed by various distributed components of a system. For example, one or more processors may execute these system functions, wherein the processors are distributed across multiple components communicating in a network. The distributed components may include one or more client and server machines, which may share processing, in addition to various human interface and communication devices (e.g., display monitors, smart phones, tablets, personal digital assistants (PDAs)). The network may be a private network, such as a LAN or WAN, or may be a public network, such as the Internet. Input to the system may be received via direct user input and received remotely either in real-time or as a batch process. Additionally, some implementations may be performed on modules or hardware not identical to those described. Accordingly, other implementations are within the scope that may be claimed.

REFERENCE SIGNS LIST

1, **1**A, **1**B, **1**C Banknote processing apparatus
2, **2**A, **2**C First storage unit
3 Second storage unit
4, **4**A, **4**B, **5** Transport unit
10 Housing
10A Lower housing
10B Upper housing
11 Dispensing unit
12 Recognition unit
13 Temporary storage unit
14 Memory unit
15 Control unit
16 Depositing unit
21 Recycling storage apparatus
21A First recycling storage apparatus
21B Second recycling storage apparatus
21C Third recycling storage apparatus
21D Fourth recycling storage apparatus
51 Upper-side transport unit
52 Lower-side transport unit
111 Outlet

141, **141**A Abnormal note list
142, **142**A Abnormal note information
143 Storage order information
144 Abnormality factor information
145A Feeding source information
161 Inlet
211 Storage housing
212 Stage
213 Storage-transport mechanism
214 Detection unit
215 Sensor
216 Detection plate
217 Light shielding unit
218 Semi-light shielding unit
241B Serial number list
242B Banknote information
243B Storage order information
244B Serial number information
411, **511** First transport path
412, **512** Second transport path
413, **513** Third transport path
414, **514** Fourth transport path
415, **515** Fifth transport path
516 Sixth transport path
521 Seventh transport path
522 Eighth transport path
523 Ninth transport path
524 Tenth transport path
525 Eleventh transport path
4111, **5111** Upper-side path
4112, **5112** Lower-side path
4113, **5113** Rear reversing path
4114, **5114** Front reversing path

The invention claimed is:

1. A sheet processing apparatus, comprising:
a first storage and a second storage that each stores a sheet;
a transport that transports the sheet;
a recognition circuit that performs a first recognition processing to recognize the sheet;
an outlet that discharges the sheet in a case that the sheet is recognized as normal in the first recognition processing;
a temporary storage that stores the sheet in a case that the sheet is recognized as abnormal in the first recognition processing; and
processing circuitry that controls the transport and the recognition circuit such that storage control processing is performed, the storage control processing being processing in which the sheet stored in the temporary storage is transported to the first storage unit or to the second storage, wherein
the storage control processing comprises:
first processing in which, in a case where a predetermined condition is satisfied, the sheet stored in the temporary storage is transported to the second storage; and
second processing in which, in a case where the predetermined condition is not satisfied, the recognition circuit performs a second recognition processing on the sheet stored in the temporary storage, the sheet recognized as normal is transported to the first storage, and the sheet recognized as abnormal is transported to the second storage,
the first processing is processing in which the recognition circuit performs the second recognition processing on the sheet for which the predetermined condition is satisfied, and
the sheet for which the predetermined condition is satisfied is transported to the second storage regardless of a recognition result of the second recognition processing.

2. The sheet processing apparatus according to claim **1**, wherein the predetermined condition is a condition related to a number of sheets stored in the temporary storage.

3. The sheet processing apparatus according to claim **2**, wherein the predetermined condition is a condition that the number of sheets stored in the temporary storage is equal to or less than a second threshold value.

4. The sheet processing apparatus according to claim **1**, wherein the predetermined condition is a condition related to a factor resulting in the sheet to be recognized as abnormal in the first recognition processing.

5. The sheet processing apparatus according to claim **4**, wherein the factor is a serial number-related abnormality in which a serial number attached to the sheet is abnormal.

6. A sheet processing apparatus comprising:
a first storage and a second storage that each stores a sheet;
a transport that transports the sheet;
a recognition circuit that performs a first recognition processing to recognize the sheet:
an outlet that discharges the sheet in a case that the sheet is recognized as normal in the first recognition processing;
a temporary storage that stores the sheet in a case that the sheet is recognized as abnormal in the first recognition processing; and
processing circuitry that controls the transport and the recognition circuit such that storage control processing is performed, the storage control processing being processing in which the sheet stored in the temporary storage is transported to the first storage unit or to the second storage, wherein
the storage control processing comprises:
first processing in which, in a case where a predetermined condition is satisfied, the sheet stored in the temporary storage is transported to the second storage; and
second processing in which, in a case where the predetermined condition is not satisfied, the recognition circuit performs a second recognition processing on the sheet stored in the temporary storage, the sheet recognized as normal is transported to the first storage, and the sheet recognized as abnormal is transported to the second storage, and
the predetermined condition is such a condition related to a number of sheets stored in the first storage that the number of sheets stored in the first storage is equal to or less than a first threshold value.

7. The sheet processing apparatus according to claim **6**, wherein the predetermined condition is the condition related to the number of sheets stored in the first storage at a time that the storage control processing starts.

8. The sheet processing apparatus according to claim **6**, further comprising a detection sensor that detects a sheet storage state in the first storage, wherein
the processing circuitry determines the condition related to the number of sheets stored in the first storage based on a detection result of the detection sensor.

9. A sheet processing apparatus, comprising:

a first storage and a second storage that each stores a sheet;

a transport that transports the sheet;

a recognition circuit that recognizes the sheet;

an outlet that discharges the sheet; and

processing circuitry that controls the transport and the recognition circuit such that:

the sheet stored in the first storage is transported to the recognition circuit;

the recognition circuit performs first recognition processing on the sheet that has been transported;

the sheet recognized as normal in the first recognition processing is transported to the outlet; and

in a case that the sheet is recognized as abnormal in the first recognition processing and a number of sheets stored in the first storage satisfies a predetermined condition, the sheet recognized as abnormal is transported to the second storage.

10. The sheet processing apparatus according to claim 9, wherein the predetermined condition is a condition that the number of sheets stored in the first storage is equal to or less than a first threshold value.

11. The sheet processing apparatus according to claim 9, further comprising a detection sensor that detects a sheet storage state in the first storage, wherein

the processing circuitry determines a condition related to the number of sheets stored in the first storage based on a detection result of the detection sensor.

12. The sheet processing apparatus according to claim 9, further comprising a temporary storage, wherein

in a case that the sheet is recognized as abnormal in the first recognition processing and the number of sheets stored in the first storage does not satisfy the predetermined condition, the temporary storage stores the sheet recognized as abnormal.

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